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ABSTRACT

The physical, emotional, and intellectual impact of nutrition on children's ability to learn is the subject of this guide for school personnel. The guide is divided into two parts and includes two appendices. Part 1, "What We Know About the Relationship Between Nutrition and Learning," reviews research linking nutrition and academic performance. Children's behavioral development and learning ability are affected by such early nutritional influences as low birthweight and the adequacy of food consumed in day care. Evidence of the impact of hunger and undernutrition on learning is presented. A number of recent studies indicate the positive effects of child nutrition programs on children's nutritional status and learning ability. The problems of obesity and the consumption of sugar and food additives are discussed. Part 2, "Putting Into Action Our Knowledge About the Relationship Between Nutrition and Learning," provides suggestions for solving students' nutritional problems. Steps that school employees can take to ensure that children have access to nutrition programs are enumerated. School action to ensure the provision of healthful food and nutrition education is described. The guide concludes with an outline of a model school nutrition policy. Appendix A describes several national nutrition programs that help children. Appendix B lists 66 references. (AF)

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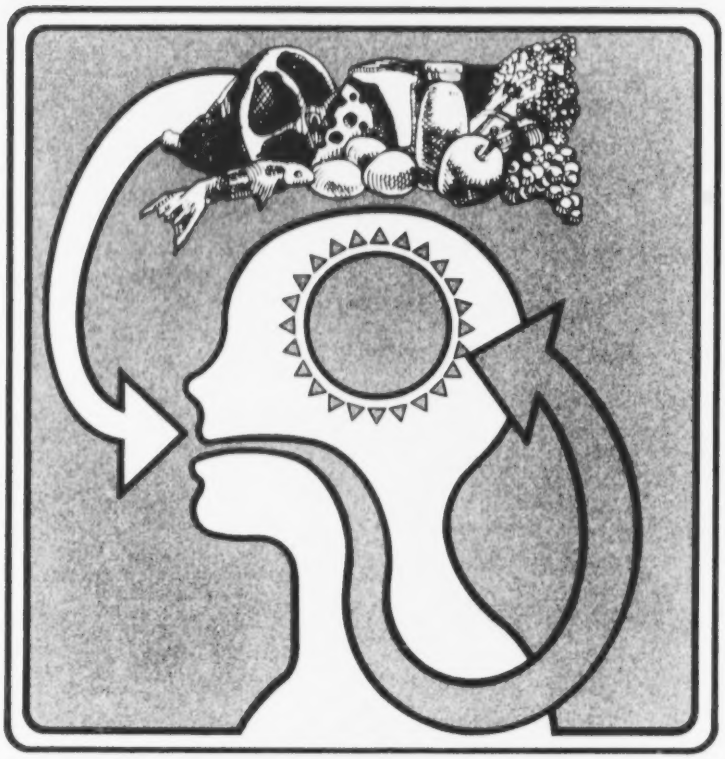

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A School Employee's Guide to Information and Action

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THE RELATIONSHIP *between* NUTRITION & LEARNING

A School Employee's Guide to Information and Action

Growing numbers of our students are coming to school burdened with disadvantages. More are poor and, because of poverty, more are ill-fed.

To help these students succeed in school, we must not only have high academic standards, but we must deal with the students' needs. Children cannot learn if they are malnourished or if they are too poor to have enough to eat.

Because we want all children to have an equal chance to succeed in school, NEA invited the Food Research and Action Center (FRAC) to prepare this booklet. It provides basic information about the relationship between nutrition and learning and includes steps for ensuring that students benefit from nutrition programs.

Use this publication to ensure that your school has breakfast and lunch programs and that there is no stigma attached to participation in them. Use it to start incorporating nutrition education into classroom learning. Thank you for helping to remove the disadvantages students bring to class.

Mary Hatwood Futrell, President
Don Cameron, Executive Director
National Education Association

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About the Food Research and Action Center

Since 1970, the Food Research and Action Center has served as a nonpartisan center seeking lasting solutions to hunger, malnutrition, and poverty in America. As a national organization based in Washington, D.C., FRAC works with individuals, elected officials, religious groups, civic leaders, educators, and the business community to solve one of America's most serious domestic problems.

By seeking improved federal food programs, greater economic opportunity for low-income people, and better protection of the rights of the impoverished, FRAC works to alleviate the hardships of hunger and poverty. FRAC's multidimensional approach of legal policy analysis, research, grassroots activities, and public information results in a coordinated and balanced effort to address the complex problems of hunger and poverty in America.

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Introduction

Nutrition and Equal Educational Opportunity

Nutrition is one of the most pervasive factors influencing growth, development and health. It is, in fact, central to child development.

Merrill S. Read, in
Malnutrition and Behavior, 1982

Breakfast Program participation by low-income children is associated with: significant improvement in academic performance [standardized achievement test scores]; significant improvement in tardiness rates; and a trend toward improvement in absenteeism.

Dr. Alan Meyers,
Boston City Hospital,
1988

...the physical evidence behind figures on food pantry growth is being in schools and watching the children attack the food because it's the first they've had since the day before.

Callie Hutchison,
Tennessee Hunger
Coalition, 1984

If you care about education, you should care about nutrition, because nutrition has a strong physical, emotional, and intellectual impact on a child's ability to learn.

In the past, people knew about these relationships because of what they saw with their own eyes or experienced in their own lives. Their strong belief in the relationship between nutrition and learning played a major role in the early creation of school-based meal programs in England, other European nations and the United States in the late 1800s and early 1900s.

Typical of the public statements on this topic at that time was a 1903 British governmental committee *Report of the Royal Commission on Physical Training* which stated, "Unless children receive proper nourishment, they cannot be expected to profit by the mental and physical training provided to them."

In 1988, the consensus among nutrition researchers confirms what earlier scholars believed—that inadequate nutrition and hunger have negative effects on learning, behavior, and productivity. Most recently, a 1987 study on the impact of participation in the school breakfast program in Lawrence, Massachusetts, revealed that achievement test scores improved significantly when children participated in the program.

The relationship between nutrition and learning has generated even greater concern recently because of increasing poverty among children. Currently, over 32 million Americans (13.5 percent) live on incomes below the poverty line. (The poverty line for a family of four in 1988 is $11,650.) Over 20 percent of children under age 18 live in poor families—1 in 5. Almost 46 percent of all Black children and almost 40 percent of all Hispanic children under 18 years live below poverty. According to the most recent census information available on American Indian and Alaska Native children, their poverty rate is 32.5 percent. This same 1979 census information reveals a 6.7 percent poverty rate among Asian and Pacific Islander children.

Almost 23 percent of children under the age of six live below the poverty line. The poverty rate is 49.0 percent among Black children under age six and 41.8 percent for Hispanic children under age six. Poverty is directly related to hunger and undernutrition.

It is not surprising, then, that hunger and undernutrition are growing problems among many children in the United States. The U.S. Conference of Mayors reported in a 1987 survey of 26 major U.S. cities that demand for emergency food assistance had increased by 18 percent that year. The number of families with children requesting assistance increased by 18 percent in the same year. Also, two out of every three people requesting emergency assistance were either children or their parents. In its 1985 survey of 370 emergency food providers nationwide, the Food Research and Action Center found that 69 percent of the providers' caseloads were families with children.

The increasing presence of hunger among families with children is also reflected in many local and state surveys of food pantries and soup kitchens.

The good news is that teachers, school officials, and many other school employees can have an impact on whether students have enough food, and food of high nutritional quality. Child nutrition programs, like the school lunch program and the school breakfast program, have the potential to help students have access to two nutritious meals every day. Moreover, they are available to all public and private nonprofit schools that request them.

Unfortunately, some schools do not take advantage of these programs. Also, barriers to participation by individuals in nutrition programs (for example, burdensome and overly complicated application processes) have resulted from legislation passed in the early 1980s. School employees can do a great deal to change this situation and ameliorate these barriers.

The purpose of this *Guide* is to assist you in understanding the relationship between nutrition and learning and to help you make an educational difference in the lives of the school children you work with every day.

This *Guide* is divided into two parts. In Part I, "What We Know About the Relationship Between Nutrition and Learning," you will read about:

- ☐ Early nutritional influences on a child before he or she ever reaches school.
- ☐ The widespread problem of poor nutrition among school-age children.
- ☐ The impact of food programs on the nutritional status and learning ability of school age children.
- ☐ How hunger, undernutrition, obesity, sugar, and food additives affect learning ability and behavior.

In Part II, "Putting Into Action Our Knowledge About the Relationship Between Nutrition and Learning," you will learn how school employees can help solve some of their students' nutritional problems.

--Lynn Parker
Director of Nutrition Policy
and Research
Food Research and Action Center

Executive Summary

Part I:

What We Know About the Relationship Between Nutrition and Learning

Early Nutritional Influences

A child's nutritional status and its future impact begin with pregnancy and early infancy. Many things affect the outcome of a woman's pregnancy, but all of them are interwoven with the impact of nutrition.

Low birthweight, which is one of the most important indicators of whether newborn babies will grow and develop normally, is related to a mother's nutritional status before and during her pregnancy. Babies with low birthweights are at greater risk of being mentally retarded or of suffering visual and hearing impairments. They are also more likely to have behavior and learning problems later in life.

Recent research confirms the links between poor nutrition during pregnancy and children's behavioral and learning ability:

- ☐ School age children in San Diego, California, whose mothers were undernourished during pregnancy interacted less with their peers, were more dependent on adults, and were sadder and more unfriendly.
- ☐ The national evaluation of the special supplemental food program for women, infants, and children, a federal program that provides nutritious foods to low-income pregnant women, new mothers, and young children at nutritional risk, showed that participation in the program decreased low birthweight rates and improved children's intellectual ability.

Considering the high rate of teen pregnancy in the U.S., the nutritional status of adolescents is of particular concern. If adolescents do not have good nutrition habits before they become pregnant, it will be difficult for them to catch up once pregnancy has started. Unfortunately, many studies have shown teens to be the most poorly nourished Americans, who tend to have the lowest participation rates in school meals programs.

Another early influence on children's nutritional status is the adequacy of foods consumed while children are in day care. If preschoolers in day care do not get enough food or the right kinds of food, they will be at risk of hunger and undernutrition.

Hunger and Undernutrition

Survey results from around the country indicate that a significant number of children are suffering from hunger and/or undernutrition. National studies confirm the existence of these problems. According to the U.S. Public Health Service, one of the Surgeon General's 1990 health objectives for the nation—eliminating growth retardation of infants and children caused by inadequate diets—cannot be met, because there still are significant numbers of low-income children whose growth is retarded.

Hunger and undernutrition are growing problems among U.S. children because these conditions are directly related to poverty, and the number of poor children is increasing. More than 32 million Americans live below the poverty line, 6.3 million more than in 1979. More than 20 percent of all American children are poor, and one in every four children under age six lives below the poverty line. Government surveys show that as income decreases, so does the nutritional adequacy of diets. The poverty level itself is based on what it costs to purchase a minimally adequate diet. This means that families living at or below the poverty level are going to have a hard time buying even a minimally adequate diet.

In order to explain the effects of hunger and undernutrition, it is important to make some distinctions between them:

- ☐ Hunger is a physiological and psychological state resulting when immediate food needs are not met. It can be relieved quickly with food. If hunger is prolonged, frequent, or chronic, it can lead to undernutrition.
- ☐ Undernutrition, the result of prolonged lack of food, can be a problem of both the nutritional quality and the quantity of food eaten. The two "kinds" of undernutrition have different effects. Severe undernutrition, which can result in conditions such as marasmus and kwashiorkor (i.e. the emaciated conditions seen in children during famines), is rare in the United States. Mild to moderate undernutrition is more likely to exist in a developed nation like the United States.

The Impact of Hunger and Undernutrition on Learning

The impact of mild undernutrition cannot be easily measured except for eventual growth retardation. However, it can have serious effects:

- ☐ Undernutrition increases the risk of illness and its severity.
- ☐ Undernutrition has a negative effect on children's ability to learn. It is difficult to isolate and measure the effects of chronic undernutrition because many other aspects of poverty may negatively affect a child's development. However, the consensus of researchers in this area is that undernutrition does have an independent effect on learning and behavior.
- ☐ The learning-related effects of undernutrition start happening before any visible signs of growth retardation occur. Undernourished children are less physically active, less attentive, and less independent and curious. They are more anxious and less responsive socially, and they cannot concentrate as well. As a result, their reading ability, verbal skills, and motor skills suffer. These effects do not have to be permanent if better nutrition is provided and the environment is improved.
- ☐ Iron deficiency anemia is a specific kind of undernutrition and is one of the most prevalent nutritional problems in the U.S., especially among children. Even mild cases lead to shortened attention span, irritability, fatigue, and decreased ability to concentrate. Anemic children do poorly on vocabulary, reading, mathematics, problem-solving, and psychological tests.

Studies show that hunger and mild-to-moderate undernutrition have similar effects on learning, although the effects of hunger are less severe:

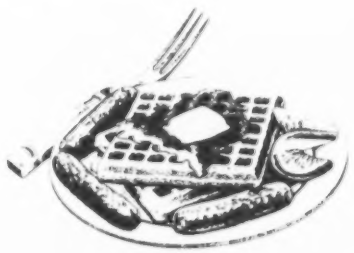
- ☐ Hunger leads to nervousness, irritability, disinterest in the learning situation, and an inability to concentrate. The hungry child is passive, apathetic, and timid, and demands little from his or her environment.
- ☐ Hunger probably has no permanent effects on the brain, but it does disrupt the learning process—one developmental step is lost, and it is difficult to move on to the next one.

Nutrition Programs Can Help Children Learn

Nutrition programs have been shown to have a positive effect on children's nutritional status and learning ability:

- ☐ A U.S. Department of Agriculture study of the lunch and breakfast programs *(The National Evaluation of School Nutrition Programs, 1983)* demonstrated that these programs make nutritional improvements in children's diets. The report of the study stated:

  "The superiority of the school lunch program is reflected in higher daily intake of nutrients for the general school age population and for all the population subgroups that were examined." In addition, the school breakfast program was shown to increase the likelihood that children will eat breakfast.
- ☐ Recent studies carried out in carefully controlled "laboratory" settings have revealed that skipping breakfast negatively affects children's performance in problem-solving situations similar to ones they face in a classroom setting.
- ☐ A 1987 study of third-to-sixth-grade Massachusetts children, found an improvement in achievement test scores, tardiness rates, and absenteeism after a breakfast program was introduced at their school.
- ☐ A recent study of the summer food program (1988) found that 94 percent of the sites served lunches that provided at least one-third of the Recommended Dietary Allowances.
- ☐ Participation in the child care food program is associated with improved nutritional intake of preschool children. The meals and snacks that day care children receive are especially important because meals and snacks contribute up to 75 percent to 80 percent of the children's nutrient intake.



In light of the mounting evidence that child nutrition programs have a very positive impact on nutritional status and learning ability, it is sad to report that these programs are not reaching many children in need:

- ☐ Currently only 40 percent of those eligible for the WIC program can be served, due to inadequate funding.
- ☐ The school lunch program reaches 24 million children a day, while school breakfast reaches only 3.7 million.
- ☐ The summer food program and child care food program are reaching a very small proportion of children who could benefit from the nutritious meals they provide.
- ☐ Half of the participants in the food stamp program are children; however, a significant number of eligible families are not participating in this program.

Obesity/Consumption of Sugar and Food Additives

Obesity is our nation's most prevalent form of malnutrition. The average child in the U.S. today is fatter than children were 20 years ago. Obesity leads to lower self-esteem among children as well as lower achievement test scores. A lower-than-expected proportion of obese people enter college.

Schools can help prevent overweight and support those who want to lose weight by providing appealing and accessible exercise programs for children of all skill levels; by offering captivating and compelling nutrition education; and by serving a wide variety of nutritionally sound and attractive food choices through the school breakfast and lunch programs and through any other food or beverage merchandising conducted by the school, such as a "student store," vending machines, and school fund-raising drives.

Dr. Ben Feingold, a pediatrician who attempted to treat hyperactivity in the children under his care in the early 1970s, was the first person to propose that food additives might cause hyperactivity and the learning and behavior problems associated with it. Since that time, researchers have attempted to develop careful, well-controlled studies of the effects of additives. These studies have not provided convincing evidence that food additives have the dramatic effect on large numbers of hyperactive children that Feingold and his followers originally suggested. Based on what is currently known, teachers and school administrators should not assume that the hyperactive children in the classroom can be cured or negatively affected by diet.

Sugar has also been implicated by some people as a cause of hyperactivity and other behavior disorders and learning problems, but research to date does not support these claims. Again, teachers and administrators cannot assume that behavior problems among their students are due to high sugar consumption. However, there are other very good nutritional and health reasons to moderate sugar consumption. Many sugary foods provide only empty calories. Others are high in fat. Moreover, sugar contributes to tooth decay.

Part II:

Putting Into Action Our Knowledge About the Relationship Between Nutrition and Learning

Ensuring that Children Have Access to Child Nutrition Programs

There are several nutrition programs that can help hungry children. School employees can take a number of steps to ensure that children benefit from them:

- ☐ If your school does not have a breakfast program, help to get one started. You will have to convince decision makers that breakfast contributes to a child's ability to learn. You will also have to explain to them that the breakfast program can be run at no cost to the school system; cooking facilities are not needed; and the service of breakfast does not have to interfere with school schedules.
- ☐ Encourage your school or your community to run the summer food program.

  Because of current restrictions in the law, only schools, residential camps and municipal county governments can operate this program. The summer food program offers schools the opportunity of ensuring that low-income children who receive nutritious lunches from them during the school year can also receive them during the summer.
- ☐ Make sure parents know about the nutrition programs available to them, and how to participate.

  Let young families know about the child care food program. In your dealings with mothers of infants and pregnant teens, suggest application to the WIC program. If families are in need of money for food, encourage them to apply to the food stamp program. Help families fill out free and reduced price meal applications for the school lunch and breakfast programs.
- ☐ Work to remove the stigma from participation in the school breakfast and lunch programs. Some students feel singled out as being poor when they receive free meals. Just eating in the cafeteria is seen by some students as a statement of poverty. Institute collection methods that don't distinguish poor children from others, and make the programs attractive to children at all income levels.
- ☐ Increase participation in the child nutrition programs by working with school administrators, school board members, school food service personnel, parents, and students to improve the quality of the nutrition programs in your school. Work together to create a more pleasant atmosphere in the cafeteria; nutritious, healthful meals that taste, look, and smell good; enough food to satisfy children's appetites; and parent and student involvement in the programs.

Ensuring that Children Receive Healthful Food and Good Nutrition Education

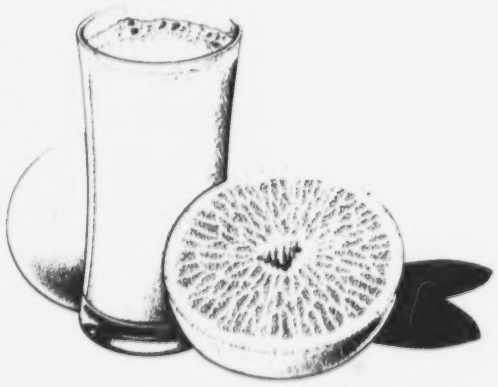
Parents and educators share a growing concern about the relationship between nutrition and future health problems such as cardiovascular diseases, cancer and diabetes, and the effect of early food habits on an adult's eating patterns.

- ☐ If you are concerned about these issues, you may want to work with others, including parents, students, school administrators, school board members, the school food service manager, and other school food service employees, to make gradual changes in the child nutrition programs, so that modifications are more easily accepted. The school food service director will need this kind of broad support to make changes in the programs.
- ☐ Nutrition education can be incorporated into classroom learning in creative ways. School food service personnel can be invited into the classroom to talk about school meals and the nutritional quality of foods, to prepare foods for tasting with the assistance of the students, or to work with them to develop new menus, based on the nutritional requirements of the programs. Mathematical concepts and basic writing skills can be taught with nutrition education. Nutrition education can be integrated into reading, science, geography, sociology, foreign languages, art, and history.
- ☐ If school officials sell foods in competition with the school lunch program, encourage them to offer only nutritious, healthful foods to children. Cafeteria vending machines full of candy bars do little to encourage the consumption of nutritious lunches.

A School Nutrition Policy

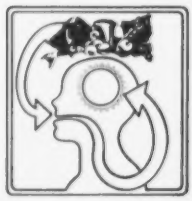
Using the information in this guide, you may want to work together with others to develop a nutrition policy for your school. This policy should include a statement of goals, an assessment of the current situation at your school, and proposed steps to improve the school's "nutritional environment." Official approval of this policy by the school board will go a long way toward ensuring that you will reach your nutrition goals within a reasonable time period.

Many factors affect children's ability to learn, and nutrition is one factor about which we easily can do something. With the information already available to us and the nutrition programs currently in place, schools can make a nutritional and educational difference in children's lives now and long into the future.



PART I:

What We know About the Relationship Between Nutrition and Learning



Chapter 1

The Relationship Between Nutrition and Learning

The hungry child is apathetic, disinterested, and irritable when confronted with difficult tasks. He tends to live in a world of his own, relatively independent of the world around him. To the extent that his parents, peers, or teachers respond negatively to his behaviors, his isolation is increased.... Being hungry in a world where others are not decreases one's sense of self worth, further stigmatizing the child in his own eyes and those of his teachers. Thus he fails to learn for social and psychological reasons, not for biological or neurological ones. The net effect is the same, however; another child has failed to achieve his full potential.

Merrill S. Read, in
Malnutrition and Behavior, 1982

Early Nutritional Influences on Learning Ability

Before children enter the elementary school classroom for the first time, many things have affected their potential to perform well in school. We know that the quality and quantity of mental stimulation and experiences they have received at home and in preschool settings strongly influence their learning ability at school age. But what about the nutritional ones?

Sometimes we forget that a child's nutritional status and its future impact on learning begin with pregnancy and early infancy. The growth rate of the fetus is more rapid at this time than at any other time of life, and this growth depends on nutrients from the mother's food intake.

Many things affect the outcome of a woman's pregnancy—genetic factors, infection, exposure to drugs and chemical hazards, economic and social conditions, and prenatal care, to name a few—but all of these are interwoven with the impact of nutrition.

Low birthweight (5 1/2 pounds or less), is one of the most important indicators of whether newborn babies will grow and develop normally. According to a recent review of all the scientific literature on this topic by the Institute of Medicine at the National Academy of Sciences, low birthweight is related both to poor nutritional status of the mother before she becomes pregnant and poor weight gain resulting from an inadequate diet during pregnancy. Babies with low birthweights are at greater risk of being mentally retarded or of suffering visual and hearing impairments. They are also more likely to have behavior and learning problems later in life.

Recent research has confirmed the links between poor nutrition of pregnant mothers and their children's behavior and learning ability. For example, investigators from Harvard Medical School and the National Institute of Mental Health studied children in San Diego, California, whose mothers were undernourished during pregnancy and whose weights were low at birth. When these children were compared, at school age, to other children of better-nourished mothers, the undernourished children interacted less with other children their age, were more dependent on adults and were sadder and more unfriendly. They seemed to withdraw from their environment, which was predicted to have a negative effect on later social and emotional development.

The national evaluation of the WIC program,* carried out under the auspices of the U.S. Department of Agriculture, showed the positive impact of supplemental nutrition of pregnant women on the head circumferences of their newborn infants. (Head circumference at birth may have a relationship to future intellectual ability.) In the same study, four- and five-year-old children whose mothers received WIC benefits when they were pregnant scored significantly higher on vocabulary tests than children whose mothers did not receive these benefits. Those whose WIC benefits were initially received after the first birthday had significantly better memory of numbers than comparable children who did not receive these foods. In another study, rural Louisiana children whose mothers received WIC benefits prenatally scored significantly higher on tests of intelligence quotient (IQ), attention span, visual-motor skills, and school achievement than children whose mothers did not receive the supplemental foods.

These studies raise two important issues for those in education: teen pregnancy and the adequacy of teenagers' nutritional intake before and during pregnancy. Across the country, in rural and urban areas and among all racial groups, teen pregnancy is a problem. According to the Children's Defense Fund, approximately 1.1 million teens were pregnant in 1985. There were 478,000 births to teens that year, most of them the result of unintended pregnancies.

The nutritional status of adolescents is closely linked to the future health of their babies. Unfortunately, many studies have shown teens to be the most poorly nourished Americans and those who tend to have the lowest participation rates in school meals programs. Also, according to one study, many poor families make food available to the younger family members first. The older ones are expected to find other ways to get food, since they can be more independent.

The occurrence of pregnancy at the same time as the adolescent growth spurt can compromise both the mother's and baby's growth. Also, poor teens are more likely to become mothers than nonpoor teens, and poor teens have less access to the food and health care they need during pregnancy. As a result, high rates of low birthweight and mental retardation are often connected with teen pregnancies.

If adolescents do not have good nutrition habits before they become pregnant, it will be difficult for them to catch up once pregnancy has started. Unfortunately, adolescent nutrition is endangered by many conditions related to being a teenager in our society, including teenagers' concerns about weight gain; their less-than-nutritious snack patterns; their tendency to skip breakfast; their tendency to skip other meals because of many extra-curricular activities; and their frequent prejudice against the school lunch program (because of short lunch periods, a dislike for the food served, wanting to socialize rather than sit in the cafeteria, peer pressure, or the stigma attached to some school cafeterias because a particular "undesirable" social group has come to be identified with it.) Adolescent nutrition is also adversely affected by policies that allow students to leave the school during lunch-time or permit the availability of foods of limited nutritional quality in vending machines and student canteens.

Another early influence on children's nutritional status in today's world is the adequacy of foods consumed while children are in day care. Many mothers of preschool children work away from home, and their children often depend on day care providers for most of their nutritional intake. If preschoolers in day care do not get enough food or the right kinds of food, they will be at risk of hunger, and eventually undernutrition. This can be a critical issue during these early years of rapid growth and intellectual and social development.

Whether a child receives high quality nutrition at a day care center or family day care home depends on the accessibility, quality, and affordability of child care in general. In addition, the chances that a child will receive nutritious meals and snacks at a day care center or family day care home can be significantly improved by participation in the child care food program. (See Chapter 2 and Appendix A for more details.)

**WIC, or the Special Supplemental Food program for Women, Infants, and Children, is a federal food assistance program that provides nutritious food to supplement the diets of low-income, pregnant women, new mothers, and young children who are at nutritional risk. The program also provides simple medical examinations and nutrition education for partipants.*

Hunger and Undernutrition Among America's Children

Survey results from around the country confirm that a significant number of children are suffering from hunger and/or undernutrition in the United States.

- ☐ A 1985 study carried out by the Public Health Department in Utah showed that almost one-third of all children surveyed among the low-income population were below the fifth percentile for height for their age. This is six times the level expected in a normal population. Also, one-fifth were below the fifth percentile for weight for their age—four times what one would expect.
- ☐ A 1983 study carried out by the Public Health Department in Massachusetts showed that chronic malnutrition is a significant public health problem among low-income, preschool children in Massachusetts, with 9.8 percent of the children identified as having low height-for-age. In addition, anemia was present in 12.2 percent of the children. (The Southeast Asian children had levels of low height-for-age and weight-for-height which were significantly higher than the other racial groups.)
- ☐ A 1983 study of children under age five admitted to Boston City Hospital's emergency room found the prevalence of growth retardation to be nearly three times the expected rate for a normal population of children.
- ☐ A 1983 assessment of the nutrient intake of low-income children through dietary interviews at the children's clinic of the Cook County Hospital in Chicago revealed that 48 percent of the children under two years old had nutritionally deficient diets.
- ☐ A 1986 study of hunger among low-income children In New Haven, Connecticut, found that 18 percent of families with children between the ages of one and 11 had a chronic hunger problem and another 7 percent of these children were at risk of developing a serious hunger problem. In addition, the study found that 65.3 percent of the households had experienced at least one indicator of a hunger problem.
- ☐ A 1986 hunger survey in Milwaukee found that 16 percent of the children served by food pantries in the city were forced to skip one or more meals per day due to lack of food and money.
- ☐ A 1986 survey of emergency food shelf users in the state of Minnesota revealed that 21 percent of all households with children reported that their children missed meals on a regular basis because there was not enough money to buy food.
- ☐ In 1987, the U.S. Conference of Mayors documented an 18 percent increase in the number of families with children who were seeking emergency food in major cities across the nation.

National studies confirm the existence of these problems. According to the U.S. Public Health Service, one of the Surgeon General's 1990 health objectives for the nation—eliminating growth retardation of infants and children caused by inadequate diets—cannot be met, because there still are significant numbers of low-income children whose growth is retarded. This conclusion is based on growth measurements of children receiving health services. (The problem would probably appear even greater if children not participating in any health program were also measured, since they are likely to be worse off.) In addition, according to the most recent nutrition surveillance data from the Centers for Disease Control, iron deficiency anemia remains a significant health problem among low-income children.

There is a lack of up-to-date, comprehensive national statistics on hunger and undernutrition among children. However, past data show that although U.S. schoolchildren as a whole are not at risk of being malnourished, a significant number of low-income children are suffering from undernutrition. Currently national studies show increases in the number of families going to emergency food centers, and in the number of homeless families. In addition, the poverty rate among children has increased phenomenally, and poverty is directly related to hunger and undernutrition.

In order to explain the effects of hunger and undernutrition and the differences in the severity of these problems, it is important to share common definitions of these terms and make some distinctions between them. These

words can be defined in many ways, but the definitions given here reflect the essence of the differences between the two terms.

*Definitions—Hunger and Undernutrition**

Hunger is a physiological and psychological state resulting when immediate food needs are not met. It can be relieved quickly with food. This condition is more difficult to identify and measure than other nutrition-related problems. If hunger is prolonged, frequent, or chronic, it can lead to undernutrition.

Undernutrition, which is the result of prolonged lack of food, can be a problem of both the nutritional quality and the quantity of food eaten. It results in specific physiological symptoms, so it can be detected in height and weight, physical examinations and biochemical (blood) tests. Unfortunately, however, by the time these physiological symptoms show up, deficiencies of important nutrients have been a problem for quite a while.

The two kinds of undernutrition have different effects. Severe undernutrition, which is rare in the United States, can result in conditions such as marasmus and kwashiorkor (i.e., the emaciated conditions seen in children during famines), goiter (iodine deficiency), and severe growth retardation. This kind of undernutrition can be life-threatening. Many researchers believe that it can mean permanent damage to learning ability in some children because of changes in the structure of the brain. There is still some controversy about the reversibility of this damage. Even if the damage is not permanent, however, prolonged rehabilitation is required to recover from severe undernutrition.

The other kind of undernutrition is called "mild," "moderate," or "chronic" by researchers. This is not the obvious undernutrition—bellies are not distended, and pellagra and scurvy do not result. However, with this kind of undernutrition, which is more likely to exist in a developed nation like the United States, there is a physical manifestation that is simple to measure—growth is slower than normal. Undernutrition in the United States usually does not show up as a particular deficiency disease resulting from the lack of one nutrient, except in the case of anemia, which will be discussed later in this chapter. The emphasis in this guide will be on the effects of mild-to-moderate or chronic undernutrition, hunger, and iron deficiency, since these are the more common nutrition-related problems in the United States.

The Impact of Undernutrition on Children's Ability to Learn

As mentioned earlier, the impact of mild undernutrition cannot be easily measured except for eventual growth retardation. This delay in growth occurs because the body puts the decreased food intake into its most important functions and slows down the less crucial ones in order to survive. First weight gain, and then height, are slowed. Thus low weight-for-height can be a sign of acute and immediate food problems, while short stature (height-for-age) can indicate longer term nutritional deprivation.

Mild undernutrition can also lead to an increased risk of infections—illnesses become more frequent and more severe. This obviously has an impact on children's school performance. When children are sick, they do not learn as well because they are not interacting as much or as well with their environment. Also, school days are lost due to absence.

In addition, mild undernutrition has a more direct effect on learning. Researchers point out that the effects of chronic undernutrition are difficult to isolate and measure because many other aspects of poverty may negatively affect a child's development (e.g., inadequate health care and lack of quality education), and because the effects of mild undernutrition are more subtle than those of severe undernutrition. However, the consensus of the studies that have been carried out on the relationship between undernutrition and learning is that although mild-to-moderate undernutrition is intertwined with other causes and effects, it has an independent effect on learning and behavior. Moreover, poor nutrition has what is called a "synergistic" effect. A "synergism" occurs when the effect of several factors working together is greater than the total effect of all of the factors individually. Poor nutrition makes poverty's impact on learning even more negative.

**Malnutrition means poor nutrition, which can include both under- and overnutrition.*

The learning-related effects of undernutrition precede growth retardation. When children are undernourished, they are less physically active and do not explore their environment the way their better-nourished peers do. They are less attentive, less independent, less curious, and less interested in their environment. They are apathetic, irritable, and tired. They are more anxious and less responsive socially, and they cannot concentrate very well. None of these traits is conducive to learning.

Because these undernourished children do not interact well or fully with their environments —including their parents, peers, teachers, and the physical objects conventionally used for learning—they do not learn as well. Their mental performance, including their reading ability and verbal skills, is delayed, and their motor skills suffer. Their behavioral development is negatively affected. And their inability to learn can become a vicious cycle, because it can evoke negative responses from the very people children depend upon for their sense of self-esteem.

Researchers believe that the effects of mild-to-moderate undernutrition do not have to be permanent if better nutrition is provided and the child's environment is improved. However, during the periods in which children are undernourished, learning is slowed considerably.

Iron deficiency is a specific kind of undernutrition. It is one of the most prevalent nutritional problems in the U.S., especially among young children. This condition affects children at all income levels, but its incidence is higher among poor children. It is defined as the decrease or disappearance of iron stores in the body. Iron deficiency anemia does not develop until all the storage iron has been used up and changes in the red blood cells result.

The effects of iron deficiency and anemia on learning and behavior are similar to those of mild-to-moderate undernutrition, and probably do not result in permanent changes in the brain. According to recent research, however, even mild cases can significantly influence the behavior of young children and adolescents. Iron deficiency and anemia lead to shortened attention span, irritability, fatigue, and a decreased ability to concentrate. As a result, anemic children tend to do poorly on vocabulary, reading, mathematics, problem-solving, and psychological tests. Their scholastic performance is lowered, the development of their motor abilities is delayed, their memories are impaired, and their ability to combat infections is reduced. These effects are even worse if the lack of sufficient iron is coupled with chronic undernutrition.

An important benefit of healthy iron status for low-income children is that it can reduce the chances that children will develop lead poisoning, because iron displaces lead. Since low-income children are most likely to suffer from iron deficiency, as well as most likely to be exposed to lead because of the environments in which many of them live, the iron status of low-income children becomes particularly important. Even small amounts of lead in the body can have negative cognitive and behavioral effects.

The Impact of Hunger on Learning

Studying the effects of hunger is complicated by the same problems faced in determining the influence of undernutrition: it is difficult to isolate hunger from other factors that might be having a negative impact on learning and behavior. Also, as mentioned before, hunger is hard to measure, and its behavioral effects are still difficult to document scientifically.

Several studies, however, show that hunger and mild to moderate undernutrition have similar behavioral effects. These include the classic starvation studies carried out by Dr. Ancel Keys in 1950. In these studies, Keys investigated the effects of starvation on young male adults. Hunger was experienced by the men at the beginning of the starvation process. The first effects of hunger were irritability, disinterest, and apathy, traits which are counterproductive to learning. Although the effects of starvation as observed in the Keys study are much more severe than those of hunger, this study provides some evidence about the initial effects hunger has.

The current consensus among experts and researchers is that hunger affects behavior in such a way as to interfere with the normal learning process. Hunger, like undernutrition, leads to nervousness, irritability, disinterest in the learning situation, and the inability to concentrate. The hungry child is passive, apathetic, and timid and demands little from his or

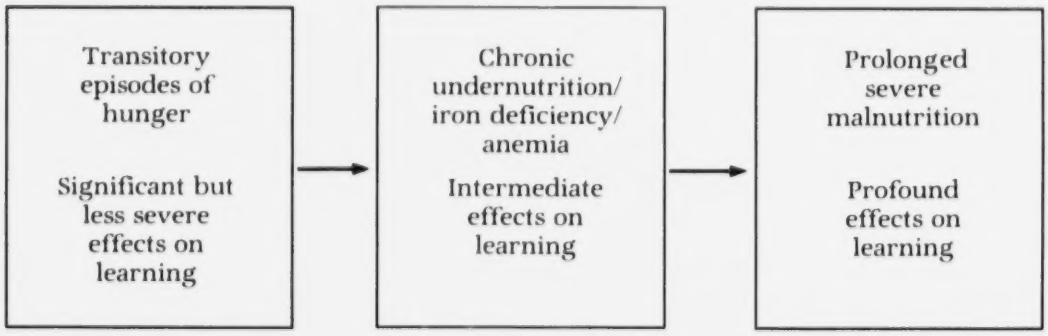
her environment or the people in it. Like undernutrition, hunger probably has no permanent effects on the brain. But, it does disrupt the learning process—one developmental step is lost, and it is difficult to move on to the next one. The child cannot do as well in school, and, as a result, is not praised as are other children. Thus, hunger can lead to plummeting self-esteem for this child. A child with low self-esteem is not a good candidate for successful learning.

According to Dr. C. Keith Conners in "Nutritional Therapy in Children" (see References in Appendix B), although one would expect evolution to have created a human brain that is insulated from the effects of a missed meal or an inadequate one, recent research on skipping breakfast (described in the next chapter) seems to belie that notion. This research indicates that the brain can be significantly affected by short-term fasting or hunger. Conners writes:

> *...it seems unlikely that evolution will have prepared children for the sustained demands on cognitive function that modern schools require.... The brain itself has virtually no reserves of glucose, its main energy source, and must constantly replenish it through transport across the blood-brain barrier. Sustained mental work requires large turn-over of brain glucose and its metabolic components. Perhaps, then, when placed under the heavy energy demands of mastering a complex technological curriculum, a child of normal intelligence is not biologically adapted to wide fluctuations of his internal nutritional milieu. The stresses associated with mental work may be significant, adding to the central load of demand on energy reserves.*

A Continuum of Effects

The differences in effect between mild undernutrition and hunger are a matter of degree. According to researchers, one can think of them as being on a continuum, as pictured below:


Transitory episodes of hunger
Significant but less severe effects on learning
Chronic undernutrition/ iron deficiency/ anemia
Intermediate effects on learning
Prolonged severe malnutrition
Profound effects on learning

The Quality of Children's Lives

It should be emphasized that the negative effects of hunger, iron deficiency, anemia, and undernutrition on a child's quality of life are severe and should be avoided at all costs. The enjoyment of human relationships, the physical world, and the internal world of thought are all affected negatively by inadequate nutrition.

According to Dr. Aaron Shirley, a member of the Physician Task Force on Hunger in America and a practicing pediatrician in Jackson, Mississippi:

> *...the physiological response to inadequate diet has a psychosocial aspect. Such outcomes as anxiety, dependency and hostility have been observed in malnourished children. In addition, the child who is poorly nourished is being given a very powerful message about his or her relationship to the social environment. Feelings about self-worth and about the responsiveness of the adult world are affected by the experience of being ill fed.*

If children are to have the optimal quality of life that they deserve, they must be well nourished.

Chapter 2

Nutrition Programs Help Children Learn

...A school guidance counselor testifying at a recent Worcester hunger hearing said that at her school, school meals were the only meals 90 percent of the children received.

The Boston Globe,
August 1983

Since hunger and undernutrition can have negative effects on children's ability to learn, it is important to understand the impact of nutrition programs on children's nutritional status and learning ability. The evidence collected so far illustrates the appropriateness of looking to nutrition programs to help improve or maintain the adequacy of children's diets and combat the hunger pangs which interfere with learning. (See Appendix A for a description of these programs.)

The History of Child Nutrition Programs and Their Impact on Undernutrition

The motivation behind the creation of the first child nutrition program, the national school lunch program, was a deep national concern about the poor health of many army recruits during World War II. One-third of all rejected draftees were physically unfit for service because of nutritional deficiencies. The Surgeon General at that time stated that money was being wasted trying to educate children with half-starved bodies. Congress passed the National School Lunch Act in 1946 "as a measure of national security, to safeguard the health and well-being of the Nation's children."

The most recent and comprehensive evaluations of the nutritional impact of this program and of the school breakfast program, which was begun in 1966, demonstrate the positive effects of these nutrition programs.

In April 1983, the U.S. Department of Agriculture (USDA) released its four-year, multimillion dollar evaluation of the school nutrition programs. In 1980, data were collected from a nationally representative sample of 6,500 public school students through personal interview or direct measurement. Information gathered included program participation, dietary intake, and growth measurements.

The report of this study, titled *The National Evaluation of School Nutrition Programs,* states that "the impact on dietary intake gives an indication over the short term of the extent to which school nutrition programs are attaining their goal of safeguarding the health of the nation's school age children through the provision of nutritious foods." According to the report, "Students who participate in school lunch have higher intakes of energy and more nutrients than students who do not participate in any of the school nutrition programs."

These statements do not even take into account the likely vast nutritional differences between students who participated in the lunch program and those who ate nothing for lunch. This difference showed up not only when the nutritional content of the noon meals was analyzed, but also when the day's total nutrient intake was added up. The students who did not participate in the lunch program did not make up the difference with other foods they ate during the day. These results are especially significant because four of the nutrients for which school lunch participants showed higher intakes are ones typically deficient in the diet of the school age population—vitamins A and B6, calcium, and magnesium.

The report adds that the differences in nutrient intake are accounted for principally by the higher nutritional value of school lunches compared with lunches eaten by students who did not participate in the school lunch program. This is not surprising when one takes into account the nutritional standards that govern the lunch program. Lunches, in order to be reimbursed by the federal government, must contain certain amounts of milk; lean meat, poultry, fish, cheese, eggs, dry beans or peas, or peanut butter; two or more vegetables or fruits or both; and bread, pasta, rice, or other cereal grains. According to school lunch regulations, the nutrients in the lunches, averaged over a period of time, should approximate one-third of the Recommended Dietary Allowances.* The requirement for specific kinds and amounts of foods in the school lunches increases the chances that these meals will be nutritionally adequate.

The school breakfast program was initiated by Congress under the Child Nutrition Act of 1966, "in recognition of the demonstrated relationship between food and good nutrition and the capacity of children to develop and learn, based on the years of cumulative successful experience under the National School Lunch Program...." The impetus for the creation of the school breakfast program was a widespread concern in Congress that many children, who had to travel long distances to school or who were from low-income families came to school hungry, making it very difficult for them to learn in the morning.

According to USDA's April 1983 evaluation, "The principal nutritional benefit of the breakfast program is that it increases the likelihood that children will eat breakfast. This can be considered a nutritional benefit in that, on the average, children who eat a breakfast are substantially better nourished than those who skip breakfast."

Based on projections made from the study, over 600,000 students who currently skip breakfast would eat it if the breakfast program were available in their schools.

Another study of the nutritional impact of the school breakfast and lunch programs was reported in December 1982. It used data from the USDA's Nationwide Food Consumption Survey (1977-78). This survey, covering adults and children nationwide, found that "participation in the school breakfast and school lunch programs is associated with improvements in nutrient intakes frequently found to be underconsumed by children of school age. Participation is particularly important for low-income children of all ages, for whom the nutritional benefits are even greater than for children in higher income households." Adolescents and children in higher income levels also received important nutritional benefits, according to the study.

Additional USDA analysis of the "Nationwide Food Consumption Survey," showed that low-income participants' lunches contributed 34 percent to 49 percent of the day's total intake. This demonstrates the vital importance of the contribution of school lunch to poor children's diets.

A 1988 nutritional evaluation of the summer food program showed that 94 percent of the sites studied served lunches that met one-third of the Recommended Dietary Allowances. This program can serve breakfasts and lunches meeting USDA nutritional standards to low-income children during the summer months, taking up the slack left by the cessation of the school lunch program during the summer.

The child care food program (CCFP), a food program for preschool children attending day care centers and family day care homes, provides reimbursements for the provision of two meals and a snack. In a 1981 evaluation of the program's nutritional effectiveness, USDA reported that children in day care settings participating in the child care food program ate more nutritious meals than those who were in child care sites that did not provide the program. In its report the Department stated: "...the nutritional quality of the diet and the quality and variety of food served are significantly better in participating day care facilities than in non-participating facilities."

This is a significant finding. In fact, the Select Panel for the Promotion of Child Health reported to Congress in 1981: "Some parents depend on day care providers to supply a large proportion of the food consumed by infants and toddlers five days a week. Some preschool children in day care or other group care settings receive meals and snacks there that contribute

**The Recommended Dietary Allowances are the levels of intake of essential nutrients considered to be adequate to meet the known nutritional needs of practically all healthy persons.*

75 percent to 80 percent of their nutrient intake, which suggests that careful attention should be given to the quality of the food provided in such facilities."

This finding of improved nutrition in centers and homes participating in CCFP is not surprising since the program provides funding for meals and snacks and requires that nutrition standards be met in meal planning and preparation.

The USDA has also evaluated the nutritional impact of the supplemental food program for women, infants, and children (WIC), which provides supplemental nutritious foods to low-income, nutritionally at-risk pregnant and lactating women, infants and preschool children. by the USDA. The most recent (1986) evaluation, both comprehensive and nationwide, showed improved nutritional intake for women, infants, and children as a result of participation in WIC.

In addition, the Centers for Disease Control (CDC) released a report in 1987 on the nationwide decrease in the prevalence of anemia among low-income children in the United States. CDC linked the decrease in part to participation in the WIC program and said that "such a decline in iron deficiency anemia may also lead to a decline in other adverse health effects related to iron deficiency, such as developmental or behavioral disturbances. . . ."

Although many people do not realize, the food stamp program is an important child nutrition program: one half of its participants are children. Dr. Jean Mayer, President of Tufts University and world renowned nutritionist, has called the food stamp program "the first line of defense against malnutrition in children." In June 1986 a federal advisory committee of distinguished nutrition scientists jointly sponsored by the U.S. Departments of Agriculture and Health and Human Services released a comprehensive report on the nutritional status of the U.S. population. They found that there is a statistically significant positive effect on dietary levels of nutrients in the diets of food stamp program, WIC, and school breakfast and lunch program participants, compared to similar nonparticipants. This conclusion was based on the analysis of data collected from nationwide samples of people in the United States.

The Impact of Nutrition Programs on Hunger and the Ability to Learn

Current research supports the role of child nutrition programs in helping to reduce undernutrition over time. But what is the impact of these programs on alleviating hunger and its effects? While many factors affect children's ability to learn, the evidence suggests that food programs, through their impact on hunger or on their effect on development very early in life, have a positive effect on learning ability.

- ☐ In the 1950s the Cereal Institute funded a series of studies, called the "Iowa Breakfast Studies," on the impact of eating breakfast on the ability of 12-to-14-year-old school boys, university students, and older men to perform physical and mental tasks. Among other findings, these researchers reported that:
  - — *"The omission of breakfast results in decreased efficiency in the late morning hours, which is reflected in poorer physiologic performances."*
  - — *"The omission of breakfast was demonstrated to result in poorer attitude toward school work and to detract from scholastic achievements."*
- ☐ Since that time, many studies have examined the short-term behavioral effects of morning feeding, hunger in the morning, and participation in the school breakfast program. Dr. Ernesto Pollitt, an expert researcher on the effects of nutrition on learning and behavior, carried out a comprehensive review of the research up to 1978 and concluded that these studies "suggest that the provision of breakfast may both benefit the student emotionally and enhance his/her capacity to work on school-type tasks."
- ☐ More recently, Pollitt has conducted his own research on the effect of not eating breakfast on children's learning ability. His study, which was carried out in a carefully controlled laboratory setting, investigated the effects of skipping breakfast on the speed and accuracy of response in a number of problem-solving tasks. The

tasks were carried out in the late morning by 9-to 11-year-old, well-nourished, middle class children. Skipping breakfast had an adverse influence on these children's performance in problem-solving situations similar to ones they might face in a classroom setting. Based on this research, Pollitt testified in 1985 before the House Select Committee on Hunger and the Subcommittee on Health and the Environment that, "...we do have now evidence to conclude that the school feeding programs in the United States have significant educational benefits."

- Dr. C. Keith Conners, a researcher in the area of nutritional impacts on children's behavior, conducted a similar study with 9-to-11-year-old children. In this study, Conners tested the same children four times, at intervals of one week, twice after the children had eaten a standard breakfast, and twice after they had fasted for 12-hours. Each test day, their performance on school-type tasks was assessed three times—at 9:50 a.m., 11:00 a.m., and 12:10 p.m. Eating breakfast decreased errors on the tests. In addition, as the morning progressed, performance on arithmetic tests done between these three testing sessions was better if breakfast had been eaten.
- A 1987 study by Meyers, Sampson, Weitzman, and Kayne, child health researchers at Boston and Tufts Universities, investigated the impact of the implementation of the school breakfast program on students in grades 3 through 6. In February 1987, the school breakfast program was implemented in Lawrence, Massachusetts, where 5 percent of the students in the school district were from low-income families. Researchers compared each student's tardiness rate and standardized achievement test scores for the second semester of the 1986-87 school year (when the program was in place) with the student's performance in the corresponding semester of the previous year (before program implementation). School breakfast program participation was responsible for statistically significant improvements in attendance and in standardized achievement test scores.
- We also know that nausea, dizziness, headache, and fatigue during the morning hours are often related to skipping breakfast. These conditions can only have a negative effect on children's ability to do well in the classroom.
- Although evidence on the cognitive impact of the other child nutrition programs is not available, it is reasonable to expect that the breakfasts and lunches eaten at a child care food program site, purchased with food stamps, or eaten at the summer food program site, are likely to have similar effects to the ones already described for breakfasts in a laboratory setting.
- As for the effect of the WIC program on the ability to learn, the comprehensive USDA evaluation of the program released in 1986 demonstrated a number of strong links between WIC and intellectual ability.

In light of mounting evidence that child nutrition programs have a very positive impact on nutritional status and learning ability, it is sad to report that many children in need are not being reached by these programs. Participation in these programs can be increased, however, without adding new legislation or asking Congress to authorize the expenditure of more funds. (Specific changes in these programs would also be very helpful in expanding participation of needy people.) Participation in the WIC program, on the other hand, is limited by a cap on its funding. Currently only 40 percent of those who are eligible for the program can be served. Responsibility for solving the problems that stand in the way of needy children's participation in all of these programs lies with those of us who are concerned about quality education.

The school lunch program reaches the most children (24 million a day), one half of whom receive free meals—those whose families have incomes at or below 130 percent of the poverty line—or reduced-price meals—those whose families' incomes are at or below 185 percent of the poverty line.

The school breakfast program still has a long way to go to reach all needy children. Compared to 89,857 schools offering school lunch, only 37,033 offer the school breakfast program, with only 3.7 million children a day eating

breakfast at school. Most of the children participating in the breakfast program are low-income and are eligible for free or reduced-price meals.

The summer food program reaches only 1.6 million low-income children a day, a much smaller number than the number of low-income children receiving lunches or breakfasts during the school year.

The child care food program reaches only 1.2 million children a day. It is difficult to know how many children or day care sites could or should be participating in this program, but more people are eligible to participate than currently do. (Some schools currently use the child care food program for their preschool programs.)

Finally, the food stamp program fails to reach all those who need it. While it is difficult to estimate the number of people eligible for this program, some estimate that 40 percent of those who are eligible are not participating. Only 19 million people actually participate in the food stamp program out of a total of 32 million Americans who live at or below the poverty level. Unfortunately, outreach programs do not reach these families, and many of them are discouraged by the long and complex application forms and crowded offices.

In summary, the child nutrition programs have been shown to have a positive impact on children's nutritional status and learning ability:

- ☐ National evaluations have demonstrated that the school lunch, school breakfast, and child care food programs improve the daily nutrient intake of children.
- ☐ Studies carried out in laboratory settings reveal that skipping breakfast negatively affects children's performance in problem-solving situations similar to the ones they face in a classroom setting.
- ☐ A 1987 study found an improvement in standardized achievement test scores and attendance rates with participation in the breakfast program.
- ☐ A national evaluation of the WIC program showed improved nutritional intake for women, infants, and children as a result of participation in WIC, decreased low birth weight rates, and improved intellectual ability in children.

Unfortunately, many children in need are not being reached by these programs.

Chapter 3

The Other Side of the Coin: Obesity and the Consumption of Sugar and Food Additives

The study of nutritional influences on human behavior is in its infancy.

C. Keith Conners, in *Nutrition Effects on Behavior of Children*, 1983

Many school employees are concerned that some children eat too much food or too much of some kinds of foods. Their concerns go beyond the health of the children; they are troubled by the potential effects of overconsumption of some foods on children's learning ability. Low achievement test scores have been reported among obese children, and hyperactivity has been linked by some to food additives and sugar.

Obesity

Obesity is our nation's most prevalent form of malnutrition. The average child in the U.S. today is fatter than the child of 20 years ago. It is estimated that this condition affects 5 percent to 15 percent of infants and preschoolers and 10 percent to 35 percent of adolescents. Yet our norms as a society are slenderness and muscularity.

Dr. Leonard Taitz, author of *The Obese Child*, writes:

> *Children [who are obese] suffer more than any one else. The natural lack of inhibition and unthinking cruelty of school children toward those with a body habitus which fails to achieve a preconceived norm is a major cause of unhappiness. In a status-conscious society, being different or merely at the extreme of the norm may exact a savage penalty. Whatever one might conclude about the long-term physical hazards of obesity, there can be no doubt about its psychological and social consequences for at least some fat children. Some are merely teased, others are bullied unmercifully and some are virtually ostracized.*

Research has shown that even very young children attribute undesirable social characteristics to their obese peers. The lower self-esteem that has been reported to be a result of this ostracism is bound to have some effect on learning. One study of height, weight, and achievement scores in elementary and junior high school students found that low achievement scores were more common among overweight students than among those with normal weights. In the United States a lower-than-expected proportion of obese people enter college.

Fatness in childhood is the most important predictor of obesity in the adolescent. This fact, and the psychological impact of obesity, lead adults to want to help children lose weight. Health professionals, however, urge adults to recognize the complexity of the issue, the difficulty of losing weight, and the possible negative psychological and physical impacts of drastic weight loss regimens on children. One should not diagnose a child as obese or attempt to help a child lose weight without first understanding the problem and seeking professional help. An obese child may be overnourished with calories, but can be undernourished in vitamins and minerals. A poor child who is fat can still be consuming a diet that is inadequate in some nutrients.

Schools can help prevent overweight and support those who want to lose weight by providing appealing and accessible exercise programs for children of all skill levels by offering captivating and compelling nutrition education, and by serving a wide variety of nutritionally sound and attractive food choices through the school breakfast and lunch programs. They can also help through any other food or beverage merchandising conducted by the school, such as a "student store," vending machines, and school fund-raising drives.

Food Additives

Dr. Ben Feingold, a pediatrician who attempted to treat hyperactivity in children under his care in the early 1970s, was the first person to propose that food additives might cause hyperactivity and the learning and behavior problems associated with it. His theory, first propounded in the early 1970s, that hyperactivity was caused by a toxic reaction to these substances in genetically predisposed children, was based on clinical experiences with his patients. He pointed out in the presentation of his

theories that over 2,000 "intentional additives" are present in modern food supplies, including such substances as preservatives, stabilizers, bleaching agents, buffers, colors, sweeteners, and flavorings. He also stressed that the federal regulatory agencies that test the safety of new substances before they are added to the food supply do not normally test for negative effects on behavior.

Hyperkinesis is an umbrella term covering a wide variety of problems, including overactivity, fidgetiness, distractibility, excitability, impulsiveness, low tolerance for frustration and failure, and learning disabilities. This term often is used interchangeably with the terms hyperactivity, learning disability, minimal brain dysfunction, and attention deficit disorder.

Hyperkinesis may have a variety of causes—problems at home, emotional problems, neurological abnormalities, biochemical aberrations, or genetic abnormalities—but, at the present time, researchers do not know with any certainty the true cause of this syndrome.

Unfortunately, there is a lack of specific, objective and widely accepted criteria to define hyperkinesis or to estimate how many children actually suffer from it. However, it affects an estimated 1 percent to 5 percent of the school-age population in the United States;

Dr. Feingold constructed a highly restrictive diet to solve the problem of hyperactivity among his patients. He eliminated foods containing salicylates (a natural substance in tomatoes, cucumbers, and all common fruits), foods containing synthetic additives (e.g., commercial baked goods, lunch meats, candies, commercial beverages, etc.), and aspirin. This diet was low in vitamin C because of the lack of fruits, but later was modified to restrict only artificial colors and flavors, making it more nutritionally sound.

Because of the widespread publicity, excitement, and controversy concerning Dr. Feingold's claims of dramatic effects resulting from the implementation of his diet, two scientific panels were set up to study the food plan—the Interagency Collaborative Group on Hyperkinesis, set up by the U.S. Food and Drug Administration (FDA) in 1975 and the National Advisory Committee on Hyperkinesis and Food Additives, sponsored by the Nutrition Foundation in 1980. Both groups criticized the plan because it lacked a scientific basis and because the unmodified plan had detrimental long-term health effects. Both panels suggested the kind of careful research that would have to be done to prove that the diet had a real impact on children.

The more careful, well-controlled studies conducted since Feingold first published his theories have not provided convincing evidence that food additives have the dramatic effect on large numbers of hyperactive children that Feingold and his followers originally suggested. Although many families swear by the positive impact of the diet, researchers suggest that many of the effects they see may be the result of other factors; e.g., more attention being paid to the child.

Some research does suggest, however, that a very small subgroup of children may be sensitive to artificial colors, perhaps through an allergic reaction, so some of these families may be seeing real effects. In addition, some researchers believe that preschool children may be more likely than school-age children to be affected by these substances. No one has yet been able to identify the children who are "sensitive," although it is estimated that less than 5 percent of those who are genuinely hyperactive have some specific sensitivity to artificial colors. Research on sensitivity to additives by children and the theories that support it are still in the beginning stages and are not conclusive.

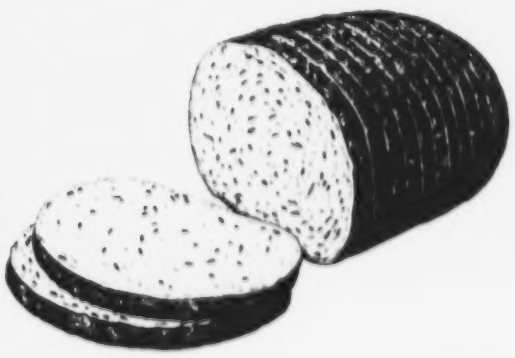
There is certainly no harm in providing children with a diet that has minimal or no artificial additives, as long as it is nutritionally adequate. However, families with hyperactive children in need of medical treatment should not turn to a diet instead of obtaining the medical advice they need. Nor should they make eating and family menu planning arduous and unpleasant tasks because of an exaggerated concern about the possible behavioral effects of particular foods.

What are the implications for schools? Based on what is currently known, school employees should not assume that the truly hyperactive children in the classroom can be cured or negatively affected by diet. Changes in diet may affect a small proportion of the children, but they are not a panacea for most behavioral problems.

Sugar

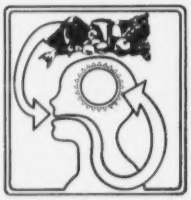
Sugar has also been implicated by some people as a cause of hyperactivity and other behavioral disorders and learning problems. However, research on the impact of sugar on behavior and learning has yielded results similar to those on the impact of additives—limited, inconsistent, and inconclusive. (Some scientists say that this is due to some poorly designed experiments.) The research suggests that if there is an effect it may depend on what else is eaten by the child (there is less of a negative effect if the sugar is "balanced" by protein foods); when he or she last ate (the effect may be worse if he or she is hungry); and the age of the child. As with food additives, it may be that a small minority of children are particularly sensitive to sugar intake, but at this time there is no way to identify who those children are.

What are the implications for the school? While school employees cannot assume that behavior problems among their students are due to high sugar consumption, they ought to know that there are other very good nutritional and health reasons to moderate sugar consumption. Many sugary foods, such as soft drinks and candy, provide only empty calories. Others, such as cookies, pastries, ice cream, and chocolate, are high in fat. Moreover, sugar contributes to tooth decay. Schools that provide a wide variety of choices of fruits, vegetables, grains, and protein sources (e.g., milk, lean meats and poultry, fish, beans, peanut butter, and cheese) will be providing less sugar and more nutrition for their students.



PART II:

Putting Into Action Our Knowledge About the Relationship Between Nutrition and Learning



Chapter 4

What Can Schools Do To Ensure That Children Have Access to Nutrition Programs?

No matter what obstacle is real or imagined, a School Breakfast program can be implemented. Breakfast can be served in an all-purpose room or in the classroom, and can be served by food service aides or by cafeteria employees. Breakfast can be hot but is just as nourishing cold and can be served prepackaged. There is no reason not to have a breakfast program. It is the easiest program to implement. It is financially advantageous to a School District to start a Breakfast program—you need only to look at the fast food chains that have realized the financial feasibility when they added breakfast to their lunch business.

Ruth Moskowitz
Director, School Food
and Nutrition Services,
Elizabeth, New Jersey

Society now has the tools to do a great deal to rectify many nutritional problems of children and decrease hunger during the school day. As mentioned in Chapter 2 and described in Appendix A, there are several nutrition programs that can help hungry children. These programs should be viewed as an integral part of the U.S. education system.

Using the School Breakfast Program

The most obvious beginning step for education employees is to look around the cafeteria and the classroom. Are children wolfing down their lunches in a way that makes you think they had little or nothing to eat the night before? If your school does not have a breakfast program or if many children do not participate in the one you have, are children falling asleep in your classroom? Do they often report to the nurse with headaches and nausea? Has the school nurse, principal, or a teacher resorted to keeping food in his or her supply cabinets to feed children who come to school so hungry that they become sick or cannot concentrate? Are children picking up handfuls of candy on the way to school because they had no breakfast at home? Do children in your school have long bus rides before they reach your classroom?

You can help by getting a school breakfast program started in your school. Despite the fact that any public or private nonprofit school can participate in this program, most still do not. Reasons given for not participating include:

- ☐ "It's not our job." Many people do not think it is the school's job to feed children. They consider it the parents' job and that it is antifamily to involve schools in the feeding programs. Yet, eating breakfast contributes to a child's educational experience. As has been discussed earlier, scientists have shown that a good breakfast is vital to a child's ability to pay attention and learn in school. Any school employee or school board member truly interested in increasing children's educational opportunities and school performance should see the wisdom of offering a breakfast program. Unfortunately, for many children, the choice is not between eating breakfast at home and eating at school. It is a choice between breakfast and no breakfast.
- ☐ "We don't have the money." While initiating a breakfast program may seem like an expensive operation at the outset, it is not

costly in practice. In fact, school breakfast programs can be run with no cost to a school system. Costs of labor, food, supplies, contracted services, administration, and often supervision are all considered direct or indirect costs of the program, and thus are eligible for reimbursement by the federal government. If the per-meal reimbursement does not cover the average per-meal cost, labor and supervision costs can be reduced by hiring workers from federally subsidized programs, such as Public Service Careers or from senior citizen's associations or by using volunteers. The additional breakfast reimbursement funds provided by 1987 and 1988 legislation should assist schools in covering costs.

- ☐ "We have no cooking facilities." You don't need any. All you really need is a refrigerator to keep milk and juice cold. Most dairies that supply milk will also supply a cooler at no charge. Dry cereals, a variety of sandwiches, and fresh fruits can all be prepared without a stove.
- ☐ "We have schedules to keep." School officials often oppose a breakfast program because they think it will not fit into the daily routine. They think that bus or classroom schedules will not allow it. Actually, scheduling turns out to be more of an excuse than a problem. The school breakfast program can be worked around existing schedules or implemented with a minimum of change.

  For example, if breakfast is served before school starts, the bus schedule can be staggered, so it is easier to serve the children as they arrive at school. A few changes in bus or class schedules may be necessary so that children on the last bus have time to eat—a five-minute change may be all that is necessary. Breakfast can also be served during the first 30 minutes of school or during a break after the first class. The break can last as little as ten minutes. Not only do fewer children eat breakfast than eat lunch, but the school needs a shorter amount of time to prepare, to allow for eating, and to clean up after breakfast.

You can help get the breakfast program started in your school—some active parents and/or the P.T.A. may be interested, so may sympathetic school board members, concerned employees and/or their local union, a school official who sees the need for the program, or a school nurse who takes care of children who have stomach aches because they are hungry. This group may want to send some of its members to visit breakfast programs in other schools, conduct a community survey to gauge the interest in the program among parents, etc. (For more information on getting a program started, write to the Food Research and Action Center for information about ordering *Fuel for Excellence: FRAC's Guide to School Breakfast Expansion* (FRAC, 1319 F Street, N.W., Suite 500, Washington, D.C. 20004).

Using the Summer Food Program

Another program upon which you can have direct impact is the summer food program. Because of restrictions in the law that covers this program, only schools, residential camps, and municipal or county governments can operate the summer food program. Many schools, therefore, have the marvelous opportunity of ensuring that low-income children who receive nutritious breakfasts or lunches during the school year can also receive them during the summer. After all, children are still learning important things during the summer, even if they are not in the classroom, and their nutritional status is affected as much by what they eat during the summer months as it is by what they consume during the school year. Unfortunately, many schools are not taking good advantage of this opportunity. The same kind of coalition of concerned people who can help start a breakfast program in the school could also put their efforts into encouraging the school to be a summer food program site.

Letting Parents Know About Nutrition Programs

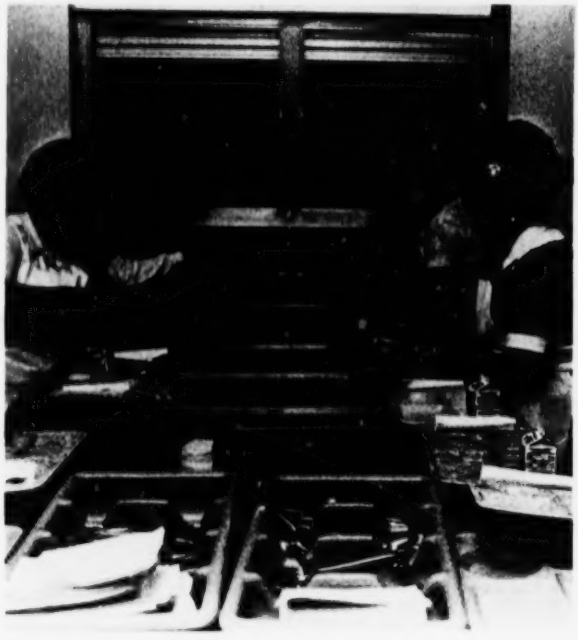
The other nutrition programs are not as directly related to the school, but you can do a lot to make sure that needy children receive the nutritional benefits these programs provide. For instance, you might want to let young families know about the child care food program. In your dealings with young mothers or teens who are pregnant, you might want to suggest application to the WIC program. If families are in need of money for food, you might want to encourage them to apply for the food stamp

program. Many local organizations carry brochures about these programs, about who is eligible, and how to apply. Perhaps you might want to keep a supply of these kinds of brochures, along with the phone numbers of local programs and antihunger organizations in your desk drawer for use with families in need of assistance.

Ensuring Accessibility to Ongoing Nutrition Programs

Having a program in place, however, is not always the final answer to the problem of hunger. Unfortunately, many children who are eligible for nutrition programs do not participate. Some reasons for this follow:

- ☐ Parents neither hear about the child nutrition programs nor think they will be eligible. At the beginning of the school year, schools send home with the students applications for free and reduced-price meals. Sometimes these forms never make it home. Sometimes, a family may not be eligible at the beginning of the school year, but will lose its income or suffer a significant decrease in income later on in the year and not know it is eligible for free or reduced-price meals. Sometimes families who move to the school district after the first of the year may be unaware of these programs. You can get involved in making sure that program benefits and eligibility standards are clear to all needy parents.
- ☐ The applications for free and reduced-price meals are too difficult to read or understand or are not written in the parents' native language. You can urge the school to translate and simplify the applications and to get community leaders involved in finding volunteers to assist families in filling in the forms. (Literacy is sometimes a problem for parents in filling in forms).
- ☐ Parents may have personal reasons for not applying for free or reduced-price meals even if their children are needy. In this situation, local officials may complete an application for the student, based on the best information they have concerning the family.
- ☐ Parents may not understand the approval or disapproval of their application, because they cannot read well or because they have difficulty reading English. Follow-up is needed with parents who do not respond to the approval of their application. Volunteers could help explain why the school returned the forms or help parents provide the missing information needed to complete the application.
- ☐ From time to time, parents may be asked to verify the information on their applications. This may confuse or frighten them, even though verification is a routine, random procedure. They may not respond to the request for verification, resulting in their disqualification from receiving free or reduced-price meals. Research suggests that many of the families who do not respond to verification requests are actually eligible for free or reduced-price meals. Again, help from a trained volunteer could reduce the fear and confusion and ensure that needy children continue to receive school meals.
- ☐ The families of children who are eligible for reduced-price meals may decide that they cannot afford the charge. Your coalition could join others in urging the schools, the city, the county, or the state to reduce the cost of reduced-price meals by subsidizing part of the cost of the meal.



There are a few other reasons why children may not be participating. Some students feel singled out as being poor in a very public way when they receive free or reduced-price meals. Just eating in the cafeteria is seen by some students as a statement of poverty. These feelings discourage students in need from participating in the programs.

You can work to remove the stigma from program participation. It is illegal to differentiate in any visible way between low-income and other students in the child nutrition programs. Different colored tickets, different lines, different seating in the cafeteria, etc., are prohibited by law. There are other ways that schools can keep track of free, reduced-price, and paid meals which do not single out poor students. For example:

- ☐ Meal payments can be collected in the school secretary's office by children or parents on a daily, weekly, or monthly basis. Identical tickets labeled only with children's names can be distributed in the classrooms by the secretary.
- ☐ Parents can be billed monthly for the full-price or reduced-price meals their children are served. All payments are mailed to the school, so that no money is collected in the classrooms. All participating students receive a monthly ticket which is punched each time the student eats. At the end of the month, the tickets are collected and the secretary calculates the amount to be billed.

The two keys to removing any stigma associated with program participation are to maintain the anonymity of the students on the subject of family income and to make the programs attractive to children at all income levels.

If the cafeteria is a pleasant place to eat, if the food is good and attractively served, if "a la carte" lines (where students buy individual items) are not separate from lunch lines, and if time for lunch is included in all children's class schedules, not just in low-income children's schedules (which has occurred in some urban schools), participation in the program can be broadened to include children at all income levels.

Increasing Participation in Nutrition programs

How can a pleasant atmosphere be created, with good food attractively served? Even the most nutritious meal is useless if the child does not eat it. What have you observed about your school's meals?

- ☐ Is food prepared on-site, or does the school serve pre-plated, frozen meals?
- ☐ Is the planned menu followed?
- ☐ Are menus varied from week to week? Do they sound interesting?
- ☐ Which items in the school meal go into the garbage can? Which are eaten?
- ☐ Is the milk cold? Frozen? Sour?
- ☐ Is hot food served hot?
- ☐ Are the vegetables over-cooked?
- ☐ Do children get enough food? Are seconds offered to those who want them?
- ☐ How do the meals taste? Does the food look good? What do the children say about the meals?
- ☐ Is the lunchroom clean and attractive? Is there enough room to eat comfortably? Is there enough time to eat? Are the lines long?
- ☐ Do students have choices of entrees, kinds of milk, vegetables, and other meal components?
- ☐ Are children and parents involved in menu planning? Is there a student-parent school meals advisory committee?
- ☐ Do students and teachers eat the same meals?

The questions above outline some of the characteristics of a high-quality meal: a pleasant atmosphere; food that tastes, looks and smells good; enough food to satisfy children's appetites; and parent and student involvement.

How can you make these things happen?

☐ *Get parents and students involved in the school lunch program.*

Every school district is required by regulation to involve students and parents in the school lunch program. This involvement may include menu planning, enhancement of the eating environment, program promotion, and related student-community support activities. The regulations also encourage school districts to use the school food service program "to teach children about good nutrition practices and to involve the school faculty and the general community in activities to enhance the program." This regulation provides a golden opportunity for you and the food service personnel at your school to help start a parent-student group that is interested in working to improve the quality of school meals.

A student-parent meal committee could be formed to taste-test new foods before they are bought or served. They could help plan menus, or work together with food service personnel to improve the atmosphere of the cafeteria. They might also want to do a student survey to find out which foods are least favored, and which new foods they would like to have. (The survey could be included in the mathematics curriculum—teaching children how to do surveys and to count and interpret the results.)

Obviously students will feel better about a program over which they believe they have some control. The chances of higher participation and less food waste increase when students have input into decisions on what will be served, and how. And the chances that the quality of a program will improve and maintain its excellence, increase when students have a say over how the program operates. Parents will be much more supportive of a good lunch program if they understand the program mechanics and are looked to for advice on how to improve its operations. Seeing how a good quality lunch program runs may have a positive impact on what parents feed their children at home.

The American School Food Service Association has published several excellent brochures on how to start "YACs," or Youth Advisory Committees, to involve students in the school lunch program. These publications describe in detail many methods for student involvement. (To obtain free copies, write to: Y.A.C. Chartering, American School Food Service Association, 5600 S. Quebec St., Suite 300B, Englewood, CO 80111.)

☐ *Make sure children get variety and choice in school meals.*

Variety is crucial. It improves both the educational and nutritional quality of the meal, and it exposes children to new food experiences. Even children get bored eating hamburgers and french fries every day! Meals should, therefore, vary from day to day and from week to week. Federal regulations recommend that schools which offer students only one choice of protein should not serve that form of protein more than three times in a single week. (For example, they should not serve hamburger, whether in the form of lasagna, hamburgers, spaghetti, or meat loaf, more than three times a week.) Schools may also fulfill the menu requirements for bread with all kinds of breads and rolls, rice, noodles, macaroni, and other pasta; and with cereal grains such as bulgur and corn grits. This should encourage schools to increase menu variety.

In addition, federal regulations encourage schools, whenever possible, to offer children a choice of foods within each meal. A fuller menu increases the chances that a child will find a food he or she likes, and choice gives the child a sense of independence.

☐ *Help to create a nice place to eat.*

Children sometimes don't eat even when the food is good—because they feel rushed or have to wait in long lines. Seating is sometimes limited, forcing children to fight one another for a place at the table. Adults may appear to be guards keeping order, not really part of the meal service. Or the room may be dark, undecorated, or poorly ventilated.

Obviously, it is hard to "pretty things up" in schools that don't have lunch rooms. Gymnasiums, auditoriums, or classrooms are used for other things, and you may have to work around these limitations.

However, many creative solutions can be worked out. Gardening, agriculture, or home economics classes can decorate the eating area with plants. Art students can turn their efforts toward covering the walls with murals and paintings, and the ceilings with pennants and kites. Future teachers could plan bulletin boards. Home economics classes could make table and counter-top decorations, colorful curtains, and bright aprons and uniforms for the staff. Shop classes can spend their time making room dividers to break down the bigness of the cafeteria, painting furniture different colors, and building booths and small tables. They can also cover the ceiling with a sound barrier made of carpet scraps attached to plywood. Music classes can plan music for the cafeteria, and debate or drama club members can be disc jockeys.

Other things that have been successful in improving the cafeteria atmosphere are:

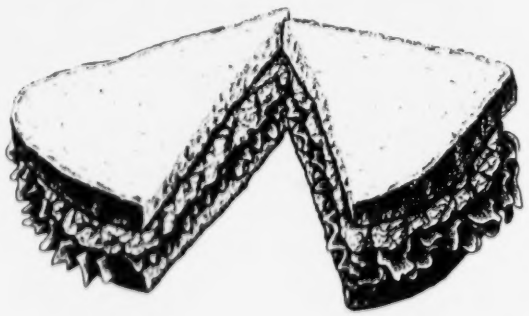
- Making sure the lunch period is long enough so that children have time to eat.
- Staggering lunch times so that no one has to wait in line more than three or four minutes.
- Convincing school personnel that good nutrition does make a difference in the health and learning ability of children so that they reflect this belief in their interactions with students.
- Having monitors sit with children during the meal, eating with them.
- Asking the principal to schedule recess before lunch so that students are more relaxed and ready to eat.

Some schools that allow students to leave the campus during the lunch period offer bag lunches that meet the school lunch requirements so that even students who "go out for lunch" get a nutritious lunch. This is also good for students who are so active in school activities that they feel they do not have the time to eat—a common problem among adolescents.

Some adolescents go hungry because they are concerned about their weight. If this is a common problem in your school, it can be partially resolved by providing low-calorie offerings as alternative choices in the school lunch program.

Other students are alienated from the school lunch program because it serves foods with which they are unfamiliar. Students who are members of ethnic and cultural minorities may be familiar with very different kinds of foods, cooking methods, and meal patterns than those common among the majority of the students and reflected in the school meals. Schools can do a great deal to make these students feel more secure and accepted and more willing to eat the school lunch if the meals served include ethnic and cultural foods. The school lunch meal pattern is flexible enough to incorporate the foods of any ethnic or cultural group. In addition, special holidays observed by American Indians and Alaska Natives, Asians and Pacific Islanders, Blacks, Hispanics, and other cultures can be celebrated in the cafeteria with ethnic foods and decorations, and tied to the social studies curriculum. With appropriate preparation, students can learn about their fellow students through the consumption of the foods their friends eat at home.

A final initiative that has been tried in some areas to help needy students, and in the long run improve the learning ability of the next generation, is to provide additional food beyond the normal lunch portions to pregnant teens attending school. These young women need more nutritious food; and schools, city and county governments, or even the state government might be convinced to provide extra funds to meet the needs of these future mothers. California's legislature has enacted such a program in that state's schools.



Chapter 5

What Can Schools Do To Ensure Healthful Foods in the Child Nutrition Programs and Good Nutrition Education?

Education of school-age children is thought to be the most cost-efficient way in which to develop a nutritionally informed population since lifetime food habits are established at an early age. Teaching wise food choices early in life helps to minimize future health care costs resulting from poor dietary choices. In a country were six of the ten leading causes of death are linked to diet, and dental caries and iron deficiency plague much of the school-age population, this is an important consideration.

Society for Nutrition
Education, 1981

The School Breakfast program can be used as a form of nutrition education. If breakfast is eaten in the classroom or "homeroom," a presentation can accompany the meal. Students can learn to make choices of what to eat from a selection of healthy foods and develop the ability to determine their own diet. Surveys of student opinions give them a say in menu development, often decrease plate waste, and teach important "hands-on" nutrition lessons. Student taste tests are fun and helpful in introducing new foods to the menu.

Kate Clancy
Professor of Nutrition
Syracuse University,
1987

In 1986, the Department of Health and Human Services reviewed America's progress in achieving the Surgeon General's national health objectives for 1990. The Department reported:

> *Over the past decade, a stronger understanding has been developed of the role of nutrition in disease prevention and health promotion. Linkages between certain nutrient deficiencies and health status have long been recognized. In recent years, diet has been associated with a number of chronic diseases, such as cardiovascular disease, cancer, and diabetes; and the focus of concern about human nutrition has moved from issues of nutritional deficiency toward increased emphasis on chronic disease prevention and health maintenance.*

Parents and educators share this growing concern about the relationship between nutrition and health and about the effect of early food habits on an adult's eating patterns. The law states that the purpose of the child nutrition programs is to "safeguard the health and well-being of the nation's children." To do this, the meals served to children should reflect everything we know about what constitutes a healthful diet. Nutrition education should be part of every school system's curriculum and should be effectively taught.

If the healthfulness of school meals and the kinds of nutrition messages they provide children are of concern to you, ask yourself these questions about your school:

- ☐ Is the school attempting to connect classroom learning about nutrition with what goes on at breakfast and lunch time?
- ☐ Do a la carte offerings include healthful choices? (A la carte items are individual foods that are purchased separate from the school lunch.)
- ☐ What kinds of foods are offered in vending machines?
- ☐ Are low-fat dairy products, fresh fruits and vegetables, legumes, and whole grain breads, served frequently?
- ☐ Are several high-fat foods served at each meal? Is this a frequent occurrence?
- ☐ Are high-salt foods a frequent offering in school meals? Are several high-salt foods offered at each meal?
- ☐ Do highly processed sweet and/or fatty foods play a major role in the meals served?

If you are concerned about nutritional quality and nutrition education, you may want to work with parents, students, school administrators, school board members, the school food service manager, and other school food service employees to make gradual changes in the program. The school food service director will need this kind of broad support to make changes in the school lunch program.

In your efforts to improve school meals, it is vital to understand the context in which you are working. School food service managers must work within the financial constraints of the reimbursements they receive from the govern-

ment, the amount of money they can charge students without discouraging them from participating in the program, and the commodities donated by the federal government. They must also compete with the fast food operations that are near most schools, especially if the school has an "open campus." Many school food service managers are achieving the goal of serving healthful meals that students want to eat, but this goal is still a challenge.

Nutrition education can be incorporated into classroom learning in fun and creative ways. School food service personnel can be invited into the classroom to talk about school meals and the nutritional quality of foods, to prepare foods to be served with the students for tasting, or to work with them to develop new menus, based on the nutritional requirements of the programs. Students can visit "behind-the-scenes" at the cafeteria to see the enormity of the operation of feeding large groups of people and ensuring nutritional adequacy at the same time. Mathematical concepts and basic writing skills can be taught with nutrition education. Nutrition education can also be integrated into reading, science, geography, sociology, foreign languages, art, and history. School health fairs can go a long way toward making learning about nutrition more fun.

As for improving the foods served, you have much to back you up. The U.S. Departments of Agriculture and Health and Human Services have published a set of "Dietary Guidelines for Americans" for use in choosing a healthy diet:

- ☐ Eat a variety of foods.
- ☐ Maintain ideal weight.
- ☐ Avoid too much fat, saturated fat, and cholesterol.
- ☐ Eat foods with adequate starch and fiber.
- ☐ Avoid too much sodium.
- ☐ If you drink alcohol, do so in moderation.

These principles can—and should—be applied to the planning and preparation of school lunch and breakfast programs. In fact, the Surgeon General has set as a health objective for the nation that school cafeteria managers should be aware of and actively promote the dietary guidelines. The American School Food Service Association, a professional association representing school food service employees, has committed itself to taking the lead in ensuring that the dietary guidelines are applied to school meal planning and preparation and is asking food distributors who sell to school meals programs to be sensitive to these guidelines. The Congress passed legislation in 1987 requiring that the surplus commodities supplied to the school meals programs comply with the guidelines. In addition, the National Cancer Institute, which is part of the U.S. Department of Health and Human Services, has worked together with the American Cancer Society to develop food service manuals and locally-based campaigns to help schools serve meals that are in keeping with the dietary guidelines. (Information about this program, entitled "Changing the Course: Eating to Reduce Cancer Risk," can be obtained from local units of the American Cancer Society.)

Other major sources of food to students are the vending machines which seem to be ubiquitous in schools today. Current federal regulations prohibit soda, chewing gum, hard candies, and frozen desserts from being sold in food service areas during meal periods. This means that these foods can be sold right outside the cafeteria and before and after meals. It also means that all other foods can be sold anytime, anywhere. Schools, school districts, cities, counties, and states can develop rules that are more restrictive than the federal regulations. In arguing for tighter rules, you may want to use the reasoning of the South Carolina School Food Service Association in its position statement on "Nutrition Policy for Food Available at School":

> *Schools should provide for immediate growth and development needs as well as provide the setting for sending positive health messages to students, faculty, staff and the community. As such, school food and nutrition education programs should provide students the opportunity for adopting and maintaining appropriate health lifestyles including food choices as part of comprehensive health education. In direct conflict with this mission is the sale of foods of minimal nutritional value on school campuses for a profit by groups other than school food services in competition with the non-profit nutritionally sound school meal programs. The sale of these foods of minimal nutritional value sends a message to students that it is acceptable to compromise health for monetary gain. This also reduces the ability of the school meal programs to maintain nutritional services to students at affordable prices.*

The need for change in the kinds of foods children are offered at school is clear. What is required is a commitment by parents, teachers, cafeteria staff, and school administrators to work together to effect the changes in a way that is acceptable to children.

Chapter 6

A Model School Nutrition Policy

You may want to work together with others to develop a nutrition policy for your school. This nutrition policy should include a statement of goals for the school, an assessment of the current situation at the school, and proposed steps to improve the school's "nutritional environment." You may want to encourage the school board to adopt the policy as a working document for reaching the nutrition goals over a certain period of time.

The goals section of the school's nutrition policy might include:

- ☐ A discussion about the important relationships between nutrition and learning and nutrition and health.
- ☐ A description of the vital role schools play in meeting the immediate growth and development needs of their students, as well as providing a setting for sending positive health messages to them.
- ☐ A statement of commitment by the school to ensure that:
  - — It will feed hungry students to the best of its ability.
  - — It will provide students access to the school breakfast and lunch programs.
  - — It will offer students the most healthful food possible in an atmosphere that facilitates its consumption.
  - — It will give students some understanding about how to feed themselves and their future families in a healthy manner.
  - — It will help students better understand the problems of domestic and international hunger and what they can do about it.

In assessing the current situation at the school, you should take into consideration:

- ☐ Do many children come to school hungry?
- ☐ Are many low-income families in your area having difficulty making ends meet?
- ☐ Is there a high level of teen pregnancy among your students?
- ☐ Are school meals as healthful as they should be?
- ☐ Is nutrition education part of the curriculum?
- ☐ Do some families find it difficult to fill in applications for free and reduced-price meals?
- ☐ Are low-income students overtly identified as poor in the cafeteria?

Based on the goals and the problems identified, proposed steps to improve the school's nutritional environment could include:

- ☐ The investigation of the need for a school breakfast program and a commitment to start the program within a certain time period.
- ☐ Acting as a summer food program site.
- ☐ Providing students' families with information on a regular basis about nutrition programs available to them, especially the lunch and breakfast programs, who is eligible, and how to apply.
- ☐ Setting up a system to help parents understand and fill out school meals applications or requests for verification, and simplifying or translating the application, if necessary.
- ☐ Obtaining subsidies from local government to reduce the cost of reduced-price meals.
- ☐ Obtaining subsidies from local government to provide more food to pregnant students.
- ☐ Developing a system to end any overt identification of low-income students participating in the school meals program.
- ☐ Incorporating nutrition education, as appropriate, into courses at all grade levels, as well as using the cafeteria, to the extent practicable, as a learning laboratory.
- ☐ Including the issues of domestic and international hunger in the curriculum.
- ☐ Improving the overall atmosphere of the cafeteria and insuring that students have sufficient time to consume their meals.
- ☐ Developing a student advisory committee to the school meals programs, or some other form of student involvement in program operations, as well as better communication with parents about the programs.

- ☐ Providing meals to children that are in keeping with the dietary guidelines.

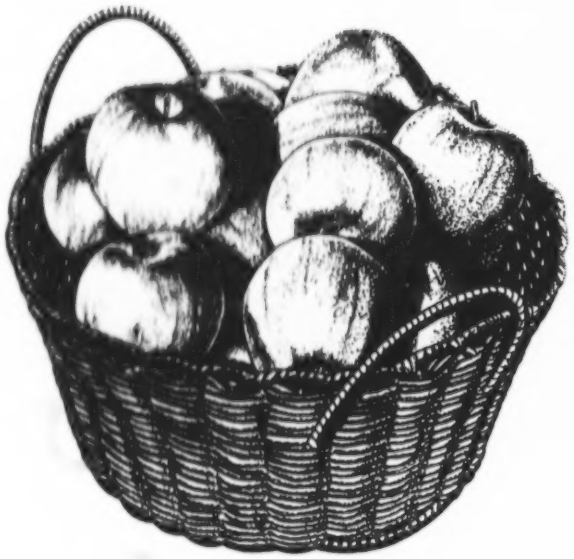
In addition, the nutrition policy should include:

- ☐ A deadline for achieving the goals.
- ☐ A designation of the individuals who will be responsible for overseeing the implementation of the goals.
- ☐ A directive to form a school nutrition committee to monitor the school's progress in making its nutrition policy a reality.

Schools Can Make A Nutritional Difference

A school nutrition policy can be used as a *teaching* and *planning* device. It *teaches* school officials, school board members, school food service personnel, teachers, parents, and students about the relationship between nutrition and learning and about what schools can do to ensure that nutritional conditions are optimum for learning. Moreover, it helps schools *plan* improvements in the nutritional environment of their students.

Many factors affect children's ability to learn. Being poor can put children at an educational disadvantage compared to their more well-off peers for many reasons besides hunger. To improve education in the United States, we need to do more than provide food to children. We need to have more well-paid and highly skilled school employees. We need more parents who help their children learn. However, nutrition is one factor affecting learning about which we can easily do something. With the information already available to us and the nutrition programs currently in place, schools can make a nutritional and educational difference in children's lives now and long into the future.



Appendix A

Nutrition Programs that Help Children

National School Lunch and Breakfast Programs

The national school lunch and breakfast programs are administered by the Food and Nutrition Service of the U.S. Department of Agriculture at the federal level, by one of a variety of state agencies (usually state education agencies) at the state level, and by the school board at the local level. All public and private nonprofit schools are eligible for the programs, and the lunches and breakfasts are available to all children in participating schools. These programs operate as entitlement programs: any school or child who meets eligibility requirements may participate.

- ☐ Household income is used to determine whether a child will pay a substantial part of the cost of lunch and/or breakfast or will receive a reduced-price or free meal. To receive a reduced-price meal, household income must be at or below 185 percent of the federal poverty level. For free meals, it must fall at or below 130 percent.

Summer Food Service Program for Children

This program is designed to provide nutritious meals to low-income children from May to September. At the national level, the program is coordinated by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA). In 35 states, the State Departments of Education are responsible for this program, and in 15 states, USDA works directly with local sponsors through its FNS regional offices.

- ☐ The summer food program is available free to all children under age 19 who attend the meal site of a sponsoring organization. At the local level, eligible sponsors are any public or nonprofit school food authorities; any public or nonprofit private residential summer camps; and all units of local, municipal, county, or state government.
- ☐ A site may qualify in two ways: by *geographic eligibility* (if the site is located in a geographic area in which 50 percent of the children qualify for a free or reduced-price meal) or by *enrollment eligibility* (if 50 percent of the children enrolled in the program qualify for a free or reduced-price school meal.) The income guidelines used are 130 percent of the poverty level for free meals and 185 percent for reduced-price meals. Once a site is approved for the program, meals are served free to all children—regardless of the family's economic situation.

Child Care Food Program

The child care food program (CCFP) is designed to assure nutritious meals for children up to age 12 and handicapped children up to age 15 who participate in a nonprofit, licensed or approved day care program. At the federal level, CCFP is administered by the Food and Nutrition Service, U.S. Department of Agriculture. At the state level, the State Department of Education or Human Services administers the program. Local sponsors include licensed child care centers and approved family and group day care homes.

- ☐ Any child who attends a participating center is entitled to meals. Programs eligible for participation include nonresidential child care institutions, such as group or family day care homes, Head Start, recreation centers, settlement houses, and after-school programs.
- ☐ All meals are subsidized with federal funds. The reimbursement rates are different for child care centers and family day care homes. Child care centers are reimbursed at the same rate as in the school lunch and breakfast programs—based on family income. There is no income (or "means") testing for family day care homes, which are reimbursed at the same rate for all children. Any centers or homes that are eligible may participate.

Special Supplemental Food Program for Women, Infants, and Children (WIC)

WIC is designed as a preventive nutrition program to provide supplemental nutritious foods, nutrition education, and access to health care to low-income pregnant and postpartum women, infants, and children at nutritional risk. The program is administered by the Food and Nutrition Service of the U.S. Department of Agriculture, which grants funds to state health de-

partments and Native American tribal agencies. State Health Departments fund local sponsors such as health agencies, social service agencies, or other nonprofit agencies that are capable of providing health and nutrition services.

- ☐ Eligibility for WIC is threefold:
  1. One must be a pregnant, postpartum, or breastfeeding woman; an infant; or a child under the age of five.
  2. One's household income must be below a level set by the state agency. (The maximum must be set between 100 and 185 percent of the poverty level.)
  3. One must be certified to be at nutritional risk, which includes problems such as abnormal weight gain during pregnancy; a history of high-risk pregnancies such as a previous still birth or low birthweight baby; growth problems such as stunting, underweight, or obesity; iron-deficiency anemia; or inadequate dietary pattern.
- ☐ WIC provides a monthly package of nutritious foods tailored to the dietary needs of infants and children; and pregnant, postpartum, and breastfeeding women. The foods are specifically chosen to provide protein, iron, calcium, and vitamins A and C—nutrients likely to be inadequate in the diets of low-income women and children. Authorized WIC foods are iron-fortified infant formula, infant cereal, milk, eggs, cheese, iron-fortified breakfast cereal, vitamin C-rich juice, beans, and peanut butter.
- ☐ WIC is a discretionary program. This means that there is a ceiling on funding for the program. As a result, many eligible women, infants, and children cannot participate because of lack of funds to operate the program for all eligible people.

Food Stamp Program

The food stamp program is designed to improve the nutrition of low-income people by providing coupons to cover part or all of a household's food budget. The program is administered nationally by the Food and Nutrition Service of the U.S. Department of Agriculture, and statewide and locally by state welfare or human services agencies.

- ☐ Eligibility is determined on the basis of the household's financial status (income and resources cannot be too high) and nonfinancial status (citizenship, social security number, work requirement). A household is defined as a person or a group of people living together, but not necessarily related, who buy and cook food together. The food stamp program operates as an entitlement program: anyone who meets eligibility requirements is entitled to receive benefits. Benefits are determined based on income.

Nutrition Education and Training Program

According to the law, the goal of the nutrition education and training program (NET) is to "encourage effective dissemination of scientifically valid information to children participating or eligible to participate in the school lunch and related child nutrition programs by establishing a system of grants to state educational agencies for the development of comprehensive nutrition information and education programs." The program has four goals:

1. To teach children the relationship between food and health and to encourage good eating habits.
2. To train food service personnel in nutrition and food service management and to encourage use of the school cafeteria as an environment for learning about food and nutrition.
3. To instruct educators in nutrition education and in the use of the cafeteria as a learning laboratory.
4. To develop or purchase appropriate nutrition education and training materials and curricula.

This program is administered nationally by the Food and Nutrition Service of the U.S. Department of Agriculture, which provides grants to State Education Agencies. The federal NET budget has remained at $5 million per year from fiscal year 1982 to fiscal year 1988. Federal grants are disseminated among the states by a formula.

Theoretically, all children, teachers, and food service personnel in public and private nonprofit schools and child care institutions who are eligible for child nutrition programs have access to the nutrition education and training program. A funding level of $5 million, or less than 9 cents per child, does not permit all to be served, however.

Appendix B

References

Akin, J.S., *et al. Nutritional Effect of School Lunch and Breakfast.* Agricultural Outlook Conference. Washington, DC: U.S. Department of Agriculture, 1982.

Allen, Lindsay H. "Functional Assessment of Nutritional Status: Its Potential for Program Evaluation in the U.S.A." Paper presented at the Nutrition Monitoring Conference. Washington, DC: December 1984.

Bettelheim, Bruno, *Food to Nurture the Mind.* Washington, DC: The Children's Foundation, 1970.

Cereal Institute. *A Complete Summary of the Iowa Breakfast Studies.* Chicago: Cereal Institute, January 1976.

Child Nutrition Forum. *Doing More With Less: Innovative Ideas for Reducing Costs in the School Nutrition Programs.* Washington, DC: the Forum, Spring 1983.

Children's Defense Fund. *A Children's Defense Budget: An Analysis of Our Nation's Investment in Children.* Washington, D.C.: the Fund, 1988.

Committee on Maternal Nutrition, FNB, NRC. *Maternal Nutrition and the Course of Pregnancy.* Washington, DC: National Academy of Sciences, 1970.

Committee to Study the Prevention of Low Birthweight, Division of Health Promotion and Disease Prevention, Institute of Medicine. *Preventing Low Birthweight.* Washington, DC: National Academy Press, 1985.

Connecticut Association for Human Services. *Community Childhood Hunger Identification Project: New Haven Risk Factor Study.* New Haven, CT: the Association, 1987.

Conners, C. Keith. *Food Additives and Hyperactive Children.* New York: Plenum Publishing Corp., 1980.

_____. "Nutritional Therapy in Children." In Gallen, Janina R. *Nutrition and Behavior.* New York: Plenum Publishing Corp., 1984.

Conners, C. Keith and Arthur G. Blouin. "Nutrition Effects on Behavior of Children." *Journal of Psychiatric Research* Vol. 117, No. 21: 193-201; 1982/83.

Conners, C. Keith, *et al.* "Experimental Studies of Sugar and Aspartame on Autonomic, Cortical and Behavior Responses of Children." Washington, DC: George Washington University School of Medicine. (Unpublished manuscript).

Fairchild, Ted. *Utah Nutrition Monitoring Project.* Salt Lake City: Utah State Department of Health, Division of Family Health Services, January 1986.

"Faulty Eating Habits: Effect on Children" *Nutrition and the M.D.* Vol. 5, No. 8, August 1979.

Food Research and Action Center (FRAC). *Bitter Harvest II: A Status Report on the Need for Emergency Food Assistance in America.* Washington, DC: FRAC, December 1985.

_____. *Fact Sheets on the Federal Food Programs.* Washington, DC: FRAC, October 1987.

_____. *Fuel for Excellence: FRAC's Guide to School Breakfast Expansion.* Washington, DC: FRAC, October 1987.

_____. *Guide to Quality School Lunch and Breakfast Programs.* Washington, DC: FRAC, January 1981.

_____. *If We Had Ham, We Could Have Ham and Eggs... If We Had Eggs: A Study of the National School Breakfast Program.* Washington, DC: FRAC, 1972.

_____. *Hunger in the Eighties: A Primer.* Washington, DC: FRAC, 1984.

Greenberg, Joel. "Unstable Emotions of Children Tied to Poor Diet." *New York Times,* September 18, 1981.

Hicks, L.E. and Langham, R.A. "Cognitive Measure Stability in Siblings Following Early Nutritional Supplementation." *Public Health Reports* 100: 656; November/December 1985.

Hunger Task Force of Milwaukee. *The Invisible Epidemic: Hunger in Milwaukee.* Milwaukee: the Task Force, 1987.

Hunt, Sara M. "Food for Thought: Ensuring Quality Programs." *School Food Service Journal,* May 1983.

Korsh, B. "Childhood Obesity" *Journal of Pediatrics* 109: 299-300; August 1986.

Kruesi, M.J.P. *Carbohydrate Intake and Behavior in Pediatric Populations.* Washington, D.C.: National Institute of Mental Health. (Unpublished Manuscript)

Massachusetts Department of Health, Division of Family Health Services. *1983 Massachusetts Nutrition Survey.* Boston: the Department, October 1983.

Meyers, Alan, *et. al. School Breakfast Program and School Performance.* Presentation before the Annual Meeting of the Ambulatory Pediatrics Association, May 3, 1988.

Miller, C. Arden, *et al. Monitoring Children's Health: Key Indicators.* American Public Health Association. 1986.

Minnesota Food Education and Resource Center. *Home-grown Hunger: A Study of People Who Use Emergency Food Shelves in Minnesota.* Minneapolis: the Center, December 1985.

National Dairy Council. "Diet and Human Behavior." *Dairy Council Digest* 52: 13-17. May-June 1981.

_____. "Nutrition and Behavior." *Dairy Council Digest* 50: September - October 1979.

"Nutrition and the School Age Child." *School Food Service Research Review.* Fall 1979.

Olson, Laurie. *Food Fight: A Report on Teenagers' Eating Habits and Nutritional Status.* Oakland, CA: Citizens Policy Center, 1984.

Oski, Frank A, *et al.* "Effect of Iron Therapy on Behavior Performance in Nonanemic, Iron-Deficient Infants." *Pediatrics* 71: June 1983.

Pelican, Suzanne, *et al. Relationships of Hunger and Malnutrition to Learning Ability and Behavior.* University Park, PA: Nutrition Education Center of the Pennsylvania State University and the Florida Department of Citrus.

Physician Task Force Hunger in America. *Hunger in America: A Growing Epidemic.* Boston, MA: Harvard University School of Public Health, 1985.

Pollitt, Ernesto. "Effects of Iron Deficiency With and Without Anemia on Mental Development Among Infants and Preschool Children." Johnson, Francis E. (ed.) *Nutritional Anthropology.* New York; Alan R. Liss, Inc. 1985.

Pollitt, E., M. Gersovitz and Gargiulo, M. "Educational Benefits of the United States School Feeding Program: A Critical Review of the Literature." *American Journal of Public Health 68:* 477; May 1978.

Pollitt, Ernesto, *et al.* "Brief Fasting, Stress, and Cognition in Children." *American Journal of Clinical Nutrition 34*; 1526-33. August 1981.

Read, Merrill S. *Malnutrition and Behavior.* Occasional Paper Series, Number 9, Volume II. Chapel Hill, NC: Institute of Nutrition, December 1982.

_____. *Malnutrition, Learning and Behavior.* Bethesda, MD: National Institutes of Health, April 1976.

Reese, William J. "After Bread, Education: Nutrition and Urban School Children, 1890-1920." *Teachers College Record* 81: 496-525; Summer 1980.

Ricciuti, Henry N. "Adverse Environmental and Nutritional Influences on Mental Development: A Perspective." *Journal of the American Dietetic Association (JADA)* 79: 115-118; August 1981.

Rumsey, Judith M. and Rapoport, J. L. "Assessing Behavioral and Cognitive Effects on Diet in Pediatric Populations." In Wurtman, R. J. (ed.) *Nutrition and the Brain* Vol. 5: New York; Raven Press, 1983.

Rush David. "National Evaluation of the Special Supplemental Food Program for Women, Infants, and Children (WIC)." In Testimony before the Senate Committee on Agriculture, Nutrition and Forestry, June 17, 1985.

South Carolina School Food Service Association. *Proposed Position Statement: Nutrition Policy for Food Available At School.* Columbia: the Association, 1988.

Taitz, Leonard S. *The Obese Child.* Oxford, MA: Blackwell Scientific Publications, 1983.

Tseng, Rose Y.L. *et. al. The Relationship Between Nutrition and Student Achievement, Behavior, and Health - A Review of the Literature.* Sacramento, CA: State Department of Education, 1980.

U. S. Department of Agriculture, Consumer Nutrition Center, Human Nutrition, Science and Education Administration. *The National School Lunch Program and Diets of Participants from Low-Income Households.* Washington, DC: Government Printing Office, June 1981.

U.S. Department of Agriculture, Food and Nutrition Service. *Evaulation of the Summer Food Service Program Final Report.* Washington, DC: USDA, August 1988.

_____. *Evaluation of the Child Care Food Program.* Washington, DC: USDA, 1983.

_____. *Income Verification Pilot Project 1982-1983, Applied Management Sciences.* Washington, DC: USDA, January 1984.

_____. *The National Evaluation of School Nutrition Programs.* Washington, DC: USDA, April 1983.

U.S. Department of Health and Human Services and U.S. Department of Agriculture. *Nutrition Monitoring in the United States — A Report from the Joint Nutrition Monitoring Evaluation Committee.* DHHS Publication No. (PHS) 86-1255, Public Health Service. Washington, DC: U.S. Government Printing Office, July 1986.

U.S. Department of Health and Human Services, Public Health Service. Office of Disease Prevention and Health Promotion. *The 1990 Health Objectives for the Nation: A Mid Course Review.* Washington, D.C.: U.S. Government Printing Office, November 1986.

U.S. Department of Health and Human Services, Public Health Service Select Panel for the Promotion of Child Health. *Better Health for Our Children: A National Strategy.* Vol. I. Washington DC: U.S. Government Printing Office, 1981.

U.S. House of Representatives, Select Committee on Hunger. *A Review of Selected Studies on World Hunger,* Washington, DC: U.S. Government Printing 1985.

_____. Select Committee on Hunger, and the Subcommittee on Health and the Environment of the Committee on Energy and Commerce, Joint Hearing. *Health Consequences of Hunger on U.S. Infants and Children.* May 1985.

U.S. Senate, Committee on Agriculture, Nutrition, and Forestry. *Compilation of Selected Federal Nutrition Statutes.* Washington, DC: January 1979.

United States Conference of Mayors. *The Continued Growth of Hunger, Homelessness and Poverty in America's Cities: 1987.* Washington, D.C.: December 1987.

Varga, James, "The Hyperactive Child: Should We Be Paying More Attention?" *Children* 133: 413-18; April 1979.

Walberg, Janet and Ward, Diamse. "Role of Physical Activity in the Etiology and Treatment of Childhood Obesity." *Pediatrician* 12:82-88; 1983-85.

Williams, Eleanor R. and Caliendo, Mary Alice. *Nutrition: Principles, Issues and Applications.* New York: McGraw-Hill Book Co., 1984.

Yip, R. *et al.* "Declining Prevalence of Anemia Among Low-Income Children in the United States." *Journal of the American Medical Association* 258: 1619; September 25, 1987.

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